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ALEXANDER HAMILTON INSTITUTE
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Managers' Handbook



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Organization *and* Management

PART I: BUSINESS ORGANIZATION

PART II: BUSINESS MANAGEMENT

BY

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Volume II

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BUSINESS ORGANIZATION

PART I

CHAPTER I

DEVELOPMENT OF ORGANIZATION

1. *Organization, a logical arrangement of parts.*—A business organization is the machine by means of which the forces of industry make themselves effective. An efficient organization, like a good machine, must work with a minimum loss of energy. Every pound of steam uselessly dissipated must detract from the efficiency of the engine as a source of power. The power that is to be directed by means of the locomotive engine should not be expended in the carrying of superfluous machinery and fuel, in climbing unnecessary grades, or in overcoming needless friction. Likewise, a business organization which is to direct the power of capital and labor through a long process of production, should not permit a dissipation of its energy. Many a business, by carrying surplus stock, by assembling goods under improper physical organization, and by running under needless friction due to poor management of labor, is wasting energy that should be realized in the profits.

To secure efficiency in the business machine it is necessary also to control the organization through intelligent direction. The principles of efficient management are discussed in Part II of this volume.

As a machine is more easily explained when the nature

of the power which it is to control is understood, so the organization of any business is more readily understood if the forces which the organization is to direct are fully comprehended. Steam and electricity stand in the same relation to the present mechanical world as capital and labor to the modern forms of business. In fact, we may say that just as a study of capital and labor has reference to the activities of industry, so a study of organization pertains to the forms of business.

A history of industrial systems is a record of the growth of capital and the consequent division of labor. The interrelation of these two forces of production are the cause of that industrial evolution which began with the simplest form—that of private production for private consumption, and has developed into our present system of machine production for the world market.

2. *Early economic man.*—Each stage in this long development has had its own peculiar organization—the typical business enterprise—this being determined by the proportion of capital to labor and by the degree of cooperation between these forces. The word “business” originally meant “being busy” in making a living, which the primitive man without tools was compelled to do with his bare hands. He was the first type of “business” man in the original sense of the word. Bodily activity and insecurity were the main characteristics of such a life since each individual depended solely upon his own labor power to win from capricious nature the immediate necessities of life. He had no stock of tools nor of food, nor in a word—capital—whereby he might make his labor power more effective, and thus secure that leisure which depends upon a surplus supply of the necessaries of life.

The most primitive man, as we know him, wandered about with his companions, who had much the same degree of organization as a herd of cattle or a flock of sheep. The leading "business" man of such an aggregation had about the same function as the aggressive leader of the drove. Coöperation, which is the purpose of any organization, was absent in any economic sense, and only in the presence of danger did the horde display a knowledge of the advantages to be gained from combined effort.

Not until the family appears do we find a new motive for the coöperation of the individuals of the society. New motives alter conditions. Here for the first time men began to work together for the common purpose of making a living. This new organization based on economic activity still limited itself to securing "just enough" to live. It did not seek to add a surplus to this competence. The "household" was the unit of this industrial enterprise. A circle drawn about each family would have circumscribed all its activities. There were no interrelations with other families. The business undertakings of one household did not interfere with or influence those of the neighbors. As we might say, production was of the people, by the people, and for the people of each particular family.

The benefits of coöperation under this form of economic organization were soon displayed. The group discovered that it could win from nature not only a competence but something more. Within each community there was accumulated a stock of goods. This had the effect of giving the masters of the households more leisure. As the surplus increased there would be not only the disposition to exchange these goods for different kinds possessed by other households, but the possi-

bility for the master to let out any surplus labor force which might have resulted from a more efficient organization.

Movements are always slow in the beginning, but as soon as capital gained a lodging in the industrial systems the cumulative effect of numberless small increments became marked. Small bits of capital planted and nurtured in thousands of families by this primitive cooperation began to swell and expand until the bands of these little isolated and exclusive industrial organizations were burst by the pressure, and the forces of production were liberated. Capital and labor flowed in many directions, seeking new levels, wearing new channels. Other lines of activity were furnished with fresh streams of power, and production was not only increased, but it resulted in varied forms of organization as well. Capital, thus freed, began to seek introduction to other households, and the laborer, more independent, sought to employ his skill by joining his services now to this household and now to that. The increase of capital in proportion to the labor force wrought an entire transformation of the family organization, since it allowed its members to step beyond its bounds and engage in new forms of independent activities.

3. *Influence of new economic activities.*—Under the family system there was no capital except in such auxiliary forms of production as the distaff, the handmill and the ax. The laborer was not free. He was tied to the land, and industrial skill was closely associated with the care of the soil. Furthermore, there was little or no commerce, as each group made all that it consumed. But when production increased to the extent that each group had a surplus, conditions were established whereby trade was sure to develop. This sur-

plus generally consisted of the prime necessities of life, such as articles of food and clothing. But under the isolated system of economy then existing there were no means whereby the surplus of one household could be exchanged for that of another. Household economy alternated between the extremes of want in one season and waste in another. This brought men to recognize the value of trading their surplus.

Commerce consists simply of the exchange of the surplus goods of one community for those of a different kind in another community. Therefore, before the industrial organization of the world could receive a new kind of enterprise in the form of commercial relations, there must first have existed the surplus wealth, the exchange of which constitutes commerce. So the growth of a stock of wealth not only transformed the relations of the members of the household to each other, but it changed the relationship existing between different households and finally the relations between localities to the nation as a whole. In time the interrelations of nations themselves became dependent upon this surplus wealth.

At present, however, we are concerned with the changes wrought in the business unit as represented by the family. It is necessary to keep in mind that a new economic activity has been created whose reaction upon the old methods of production must in a later period be treated almost as an independent cause in the shaping of economic organization. The itinerant workingman gradually acquired some surplus wealth of his own in the form of tools, and with this capital he was able to separate himself entirely from the family group and to set up for himself a permanent workshop. With the aid of increasing capital this class of men in time be-

came strong enough to effect a complete separation and to establish a new organization in industrial society. In their turn, these men became masters, not of agricultural laborers and estates, but masters of crafts and artisans.

4. *The town becomes a new economic unit.*—Under this system of industry the typical business unit was the “craft” or “trade.” The man who made things by hand was the “manufacturer,” but he possessed all the means necessary to that production in his own right. He owned the tools and the raw material, and by his own labor or under his direct supervision the article produced passed through all the stages of manufacture. The size of the representative firm under a system which compelled the master to be a skilled artisan, a shrewd financier, and an able salesman, but insisted on each article bearing the impress of his individual skill, must of necessity have been very small. That this type persisted so long and became so general throughout the fields of productive activity was due to the relatively small importance of the master’s capacity as a financier and sales manager as compared with his ability as a craftsman. The proportion of capital to labor power necessary for production was small. The master did, indeed, own the raw material in addition to his tools, but there was no need for great capital in either, as the variety of the articles demanded was limited by the customs and tastes of his own community which was still isolated and secluded even though it now embraced within its boundaries the “town” instead of the “family.” The growth of the economic unit which was now comprehended in the town meant also a great advance in the productive capacity of society and a corresponding increase of capital. Yet self sufficiency and isolation still kept com-

munities separated, and while one locality was suffering for the lack of some article, another would be greatly over-supplied with the same thing.

The town owed its development to the increased specialization of industry. The rise of the artisan class divided the field of production. The landowner still supplied the raw material, but the new class of artisans furnished the finished product. The latter found it desirable to congregate in small communities or towns, and while the conditions of the market did not demand that the artisan possess a large fixed capital in the form of extensive machinery, nevertheless there again appeared the advantages of social coöperation, and abundant movable capital accumulated in the hands of this new industrial class. Then, too, the presence of more wealth had the effect of changing the relations of members of this handicraft system. It furnished the basis for more specialization within the crafts themselves, and at the same time stimulated trade between the farm—the source of the raw material, and the town—the place of its manufacture.

Then there sprang up a class of men who saw an opportunity to equalize the economic disparities between localities. They devoted themselves to trade. Like the artisan class, these merchants furnished their own trading capital, captained their own ventures and supervised the marketing of their own goods. The business unit was small and the organization simple. But one must bear in mind that a new business enterprise becomes clearly differentiated. The peddler of the transition period, during which the industrial unit shifted from the family to the town, became a merchant. So by the end of the Middle Ages there were three distinct classes in Europe, each devoting its energies principally

to one branch of industry. The landowner in the country grew the raw material, the artisan in the town prepared it for the market, and the merchant, also of the town, assumed the risk of finding a purchaser. Yet it was in the hands of the manufacturer and the merchant that movable property accumulated fastest, and more especially was this true of the latter.

5. "*Town economy*" shows the benefits of association. —Although the conditions of production in agriculture were decidedly better, especially for the laborer, than before, and although an increased productivity supported a larger population and furnished a basis for the growing trade, still they failed to take on that development manifested in the towns. The artisans and the merchants, on the other hand, had long known the benefits to be derived from close association. Each class had been compelled in the absence of any other protection to form societies for self defense. Cut-throats in those days were not solely associated with business competition.¹ Later, however, the crafts and guilds, as these societies were called, adopted distinct business policies, and it is for this reason that we mention them. Tested by its policies, the nature of the guilds discloses itself in the following summary:

1. The basis of association was men, not capital, or division of profits. The men desired to regulate their particular business independently of other crafts.

2. The purpose was efficiency of workmanship and trustworthiness in products.

¹ "The *Victual Brothers* formed an organization modeled after that of the Knights Templars, for carrying on piracy; their motto was 'God's friend and all the world's enemy.' They had a stronghold at Gotland, in the Baltic Sea, and were long a terror to traders and fishermen; their power was broken in 1394 only by a fleet of thirty-five ships sent against them." —Clive Day, "A History of Commerce."

3. The conditions of membership included at first all who bought and sold, as well as all artisans; later they restricted themselves to professional craftsmen and merchants.

4. In so far as the character of the regulations was concerned, in general, they promoted fraternal relations between members, fair dealing in the interests of the trade as a whole; and in a special way, they provided times and places for holding particular markets, passed upon the qualities of the goods, determined prices and decided upon methods of bargaining.¹

5. In regard to competition, all rivalry among members was denounced, while outside rivals—"foreigners," or persons from any other town, were permitted only to enter the town and sell their wares at wholesale. They could not purchase goods which the townspeople wanted for themselves.

6. In regard to the guild relation to the government of the town, burgership depended on guild membership, and at the height of power they secured a political domination. The king gave the inhabitants of some towns special privileges, which meant that the guilds secured monopoly of the trade and that prices were regulated by municipal laws. But this had to be given up, especially in the case of wheat, for high prices for this commodity induced an increase of supply. If the price was set too low for a staple ware, the ware was no longer offered. The government, finding it impossible to fix a price for bread, established the "assize of bread," a sliding scale by which the price and weight of a loaf was set by the market price of wheat. This system was applied to ale also and these assizes lasted until the Nineteenth Century in some places.

¹ Seager, "Introduction to the Study of Economics," page 6.

7. The staple handicraftsmen were the butchers, bakers, brewers, blacksmiths, masons, shoemakers, saddlers, carpenters, cabinet-makers, weavers, dyers, fullers, tailors, goldsmiths, coppersmiths, harness-makers, tanners and furriers.

6. *Comparative importance of labor and capital in the handicrafts system.*—The long endurance of this system of industry is accounted for by the small amount of capital necessary to enable a man to enter into a business on his own account. Not only the master's skill, but the power too, was furnished by man. The part that labor took in production was much greater than the part which capital furnished. But the same forces which burst the bonds that confined industry to the family, again broke through the limitations set by a local town economy. Circulating capital accumulated in the hands of some guilds faster than in others. It became evident, too, that certain individual members of the guilds were gathering to themselves greater quantities of wealth than their brothers. At the same time labor was becoming redundant. So while the richer members of the town were looking for larger chances of investment and the poorer artisans were seeking for wider opportunities of employment, there arose internal bickerings which gradually undermined the guild structure from within.

At the same time a strong influence was having a similar effect from without. This was the growing demand for goods. The handicraftsman made his wares according to the tastes and orders of his customers. The customers were men well known and were comparatively few in number. Therefore the work of the handicraftsman was limited in variety and quantity and each factor could be easily and constantly ascertained. The pro-

ducer was relieved of the necessity for keeping large stores of goods on hand, and also of maintaining a big plant. From the point of view of the customer, who really determined the character and size of the business unit, this system of industry is sometimes called "custom production." The change in the character of the customer's demands was the second cause for the gradual displacement of a system whose production was by hand, whose activities were so peculiar to the town, and whose organization from a business point of view was so simple.

Before we begin to trace the changes caused by a further growth of wealth and the extension of the market, it may be well to summarize the principal facts pertaining to the handicraft system.¹ It will serve not only to bring into contrast the conditions under the earlier family system and that period of transition from the family to the handicraft system, but will afford, too, a desirable point from which to trace the later industrial developments. In the handicraft system we have what many are inclined to believe a normal system of business relations. There is a gradual advancement for the laborer, both socially and economically. From the position of apprentice he gradually progresses to the position of the independent master, receiving at all stages an income proportionate to his services. As master he produces with his own hand, directs his own capital and supplies goods for a known group of customers, while in return he gets an exact equivalent for his labor.²

7. *Second transitional period—domestic system.*—So closely allied are the meanings of the words domestic, household and family in the Anglo-Saxon languages that much confusion has arisen in the use of these names for distinguishing different systems of industry. It is

¹ See page 12.

² "Industrial Evolution," by Carl Bücher, page 160.

COMPARISON OF EARLY INDUSTRIAL SYSTEMS.

	FAMILY SYSTEM.	FIRST TRANSITION PERIOD.	HANDICRAFT SYSTEM.
System characterized.	Isolated self-sufficiency.	Beginnings of industrial aid from outside.	Peculiar to the town but still isolated and self-sufficient.
Production.	Agriculture chiefly.	Agriculture chiefly.	Agriculture in the country furnishes raw material. Trading and manufacturing in towns.
Land.	In common, large estates.	Ditto. Small peasantry.	In towns there grew up a system of burgage tenure, near to actual land ownership.
Capital.	A few simple tools owned by the master or lord.	Ditto. Sometimes owned by laborer.	Little fixed capital, increase of movable capital. Owned by artisans and tradesmen.
Labor.	Not free. Little division of employments or processes.	A free laborer appears. Hires out his services to consumer for board and shelter and travels about.	Not only free, but the laborers form a new class independent economically, politically and socially.
Power.	Human energy.	Ditto.	Ditto.
Exchange.	None.	Very limited.	Between town and country and within the town.
Market.	Consumers of the household.	Among different households.	Consumers of the local town supplemented by fairs and markets.
Commerce.	None.	Peddling.	Some distant trade in luxuries.
Place of labor.	Estate of lord.	In house of consumer.	Own home.

natural that the earlier writers should emphasize the differences which were presented from the point of view of labor. Accordingly we find the history of industrial development divided into periods conforming to the relative freedom of the laborer. Did the prevailing system employ slave, serf or free labor? Were the rights of the laborer protected by custom or contract, etc.,? Another way of distinguishing the epochs of economic development was to characterize the periods according to the place where the work was carried on. Therefore we get the familiar division of "family," "domestic," and "factory systems."

From this point of view there is little distinction between the handicraft system and the domestic system, but during the latter period there were other developments affecting the industrial organization which are as necessary to be observed as the status or condition of labor. From the view point of the capitalist and the entrepreneur, this period marks the beginning of a new differentiation in the employment and management of capital. From the view point of labor, the period may be called the domestic system only when contrasted with the period which follows, that is, the factory system. It is noticeable, however, that neither the capitalist nor the laborer have their functions so clearly separated or so closely united as under the factory system or the previous handicraft system; hence the appellation transitional period is more significant and less liable to be confused than the older expression—domestic system.

8. *Extension of national government—appearance of middle men.*—It would be difficult to understand the changes that the economic organization underwent in this period, if reference were not made to the state. Economically, this was manifested in the extension of

the national power over the domain of commerce and industry. The national government had been growing in strength and power. The protection it was able to offer its citizens allowed them more time and energy for the production of wealth. It permitted them to live outside the barricaded towns and also allowed men to spread out over the country in groups—not military assemblages, but industrial clusters—which were the beginnings of a national division of industry. As men or groups of men engaged in different industries became more separated, it was natural that a class of men should arise whose chief function was to supply the various groups with the products which each lacked. The strengthened national governments helped this interchange of products as well as the growth of capital. They offered increased protection to both.

This transitional period comes at different times in different countries but in England it extends from the middle of the Fifteenth Century to the middle of the Eighteenth. Defoe, in his tour through Great Britain (1724–1726), describes the situation thus:

The land was divided into small inclosures from two acres to six or seven each, seldom more; every three or four pieces of land had an house belonging to them, . . . hardly an house standing out of a speaking distance from another. . . . We could see at every house a tenter, and on almost every tenter a piece of cloth or kersie or shalon. . . . At every considerable house was a manufactory. . . . Every clothier keeps one horse, at least, to carry his manufactures to the market, and every one generally keeps a cow or two or more for his family. By this means the small pieces of enclosed land about each house are occupied, for they scarce sow corn enough to feed their poultry. . . . The houses are full of lusty fellows, some at the dye-vat, some at the looms,

others dressing the cloths; the women or children carding or spinning, being all employed, from the youngest to the oldest.

The clothing trade was the most highly developed, and it is here that labor and capital in business began to show their combined force under new relations to each other. Besides the "clothiers" mentioned by Defoe, who seemed to combine the double function of middlemen, collectors and distributors, there was a class of "factors" who devoted themselves exclusively to buying wool from the farmers and selling it to the "clothiers." Another class of middlemen forwarded the goods to the retailer after they were finished. This class consisted of three types, each distinguished by the method pursued in reaching the retail trade. First, there was the wholesale dealer who attended the big fairs or markets. He made large purchases and then traveled over the country with his packhorse for the purpose of selling to the retailers. Secondly, there was the merchant who bought the goods and then sent them out of the country. He was the exporter. Third, there was a composite type of distributor, who, on the one hand, was a commission man who bought from the clothiers and delivered to their "factors" in London, and on the other hand, acted as a warehouseman and looked after the disposition of the goods to the home trader and foreign exporter.¹

So we see that although industry was still carried on by hand in a small way, the functions of merchant and workman were separated. Although the merchant was not yet a capitalist nor the workman a manufacturer in the modern acceptance of the terms, still there is a distinct line of cleavage between the men who furnish the

¹ "The Evolution of Modern Capitalism," by John A. Hobson, page 59.

capital and those who give their labor. The merchant class arose during this time and toward the end of the period became the capitalists of their day. At the beginning of this period the workman owned his own tools and conducted his work at his own home, but received the raw materials from one middleman and delivered his goods to another; but he gradually lost control of his other capital possessions—his tools, which were furnished by the merchant also during the latter part of the period. The gradual loss of the economic independence of the laborer is noticeable.

9. *Organization of capital investments by the use of "joint stocks."*—Although we see here the growing importance of capital and its divorcement from the control of the laborer, still the business organization of capital was very defective. Commercial banking and credit systems were unknown. Each merchant furnished his own capital, and outside of the use of the co-partnership principle, there was very little capitalistic coöperation in the field of productive industry. The first appearance of the joint-ownership of large capitals for business purposes came in the field of the merchant's activities. The company form of organization was adopted by the great trading companies of the Sixteenth and Seventeenth Centuries. The East India Company and the Hudson Bay Company are familiar examples of the early application of this joint-stock principle to business enterprise. Men had so little experience, however, with the manipulation of great capitalistic enterprises, that few would venture their wealth unless their company was granted a monopoly by the government. But with the opening up of foreign markets and the demand thus occasioned for manufactured goods, men began to seek new methods by which

these could be supplied. Toward the end of the Eighteenth Century, therefore, we observe a tendency to bring about an extension of the joint-ownership of capital and a more effective combination of labor units in the business of manufacturing.

Mr. Cunningham cites the example of a company which in 1764 was formed with a capital of £100,000 for the manufacture of fine cambrics, but which made little progress on the whole until the next century, when the joint-stock principle was applied to production. The most important changes were brought about in attempting to apply capital more lucratively by inventing labor saving machinery and in bringing the labor units into a more effective combination. The following extract from the report of a parliamentary committee on the woolen manufacture in England in 1806 shows the condition under which the domestic system was breaking up on account of the new influences.

It may be expedient for your committee to state that there are different modes of carrying on the woolen manufacture—that of the master clothier of the west of England, the factory and the domestic system.

In all the western countries as well as in the north there are factories, but the master clothier of the west of England buys his wool from the importer, if it be foreign, or in the fleece, or of the wool stapler, if it be of domestic growth; after which, in all the different processes through which it passes he is under the necessity of employing as many distinct classes of persons; sometimes working in their own houses, sometimes in those of the master clothier, but none of them going out of their proper line. Each class of workmen, however, acquires great skill in performing its particular operation. . . .

In the factory system the master manufacturers, who sometimes possess very great capital, employ in one or more build-

ings or factories, under their own or their superintendent's inspection, a number of workmen, more or fewer according to the extent of their trade. This system, it is obvious, admits in practice of local variations. But both in the system of the west of England clothier and in the factory system the work, generally speaking, is done by persons who have no property in the goods they manufacture, for in this consists the essential distinction between the two former systems and the domestic.

In the last-mentioned or domestic system, which is that of Yorkshire, the manufacture is conducted by a multitude of master manufacturers generally possessing a very small and scarcely ever any great extent of capital. They buy the wool of the dealer; and in their own houses, assisted by their wives and children, and from two or three to six or seven journeymen, then dye it (when dyeing is necessary) and through all the different stages work it up into undressed cloth.

Various processes, however, the chief of which were formerly done by hand under the manufacturer's own roof, are now performed by machinery in public mills, as they are called, which work for hire. There are several mills near every manufacturing village, so that the manufacturer, with little inconvenience or loss of time, carries thither his goods and fetches them back again when the process is completed. When it has attained to the state of undressed cloth he carries it on the market day to a public hall or market where the merchants repair to purchase. Several thousands of these small master manufacturers attend the market at Leeds, where there are three halls for the exposure and sale of their cloths. . . .

Though the system which has been just described be that which has been generally established in the West Riding of Yorkshire, yet there have long been a few factories in the neighborhood of Halifax and Huddersfield; and four or five more. . . . These have for some time been objects of great jealousy to the domestic clothiers. . . .

Your committee cannot wonder that the domestic clothiers of Yorkshire are warmly attached to their accustomed mode of car-

rying on the manufacture. It is not merely that they are accustomed to it—it obviously possesses many eminent advantages seldom found in a great manufacture.

It is one peculiar recommendation of the domestic system of manufacture that, as it has been expressly stated to your committee, a young man of good character can always obtain credit for as much wool as will enable him to set up as a little master manufacturer, and the public mills, which are now established in all parts of the clothing district, and which work for hire at an easy rate, enable him to command the use of very expensive and complicated machines, the construction and necessary repairs of which would require a considerable capital. Thus instances not unfrequently occur wherein men rise from low beginnings, if not to excessive wealth, yet to a situation of comfort and independence.

It is another advantage of the domestic system of manufacture, and an advantage which is obviously not confined to the individuals who are engaged in it, but which, as well as other parts of this system, extends its benefits to the landholder, that any sudden stoppage of a foreign market, any failure of a great house, or any other of those adverse shocks to which our foreign trade especially is liable, in its present extended state, has not the effect of throwing a great number of workmen out of employ as it often does, when the stroke falls on the capital of a single individual. In the domestic system the loss is spread over large superficies; it affects the whole body of the manufacturers; and though each little master be a sufferer, yet few, if any, feel the blow so severely as to be altogether ruined. Moreover, it appears in evidence that, in such cases as these, they seldom turn off any of their standing set of journeymen, but keep them at work in hopes of better times.

Happily, the merchant no less than the domestic manufacturer finds his interest and convenience promoted by the domestic system. While it continues he is able to carry on his trade with far less capital than if he were to be the manufacturer of his own cloth. Large sums must be irrevocably invested in

extensive buildings and costly machinery; and, which is perhaps a consideration of still more force, he must submit to the constant trouble and solicitude of watching over a numerous body of workmen. He might then often incur the expense of manufacturing articles which, from some disappointment in the market, must either be kept on hand or be sold at a loss. As it is he can agree with his customer, at home or abroad, for any quantity of goods; and, whether on a long-expected or a sudden demand, he can repair at once to the market, and most probably purchase to the precise extent of his known wants; or, if the market happens not to furnish what he wishes to purchase, he can give out his sample and have his order executed immediately. . . .

It would not be difficult to prove that the factories, to a certain extent at least, and in the present day, seem absolutely necessary to the well-being of the domestic system, supplying those very particulars wherein the domestic system must be acknowledged to be inherently defective; for it is obvious that the little master manufacturers cannot afford, like the man who possesses considerable capital, to try the experiments which are requisite, and incur the risks, and even losses, which almost always occur in inventing and perfecting new articles of manufacture, or in carrying to a state of greater perfection articles already established. He cannot learn by personal inspection the wants and habits, the arts, manufactures, and improvements of foreign countries; diligence, economy, and prudence are the requisites of his character, not invention, taste, and enterprise; nor would he be warranted in hazarding the loss of any part of his small capital: he walks in a sure road as long as he treads in the beaten track; but he must not deviate into the paths of speculation. The owner of a factory, on the contrary, being commonly possessed of a large capital, and having all his workmen employed under his own immediate superintendence, may make experiments, hazard speculation, invent shorter or better modes of performing old processes, may introduce new articles, and improve and perfect old ones, thus giving the

range to his taste and fancy, and thereby alone, enabling our manufacturers to stand the competition with their commercial rivals in other countries. Meanwhile, as is well worthy of remark, many of these new fabrics and inventions, when their success is once established, become general among the whole body of manufacturers; the domestic manufacturers themselves thus benefiting in the end from those very factories which had at first been the objects of their jealousy. The history of almost all our other manufactures in which great improvements have been made of late years, in some cases at an immense expense, and after numbers of unsuccessful experiments, strikingly illustrate and enforce the above remarks. It is besides an acknowledged fact that the owners of factories are often among the most extensive purchasers at the halls, where they buy from the domestic clothier the established articles of manufacture, or are able at once to answer a great and sudden order; while at home, and under their own superintendence, they make their fancy goods, and any articles of a newer, or more costly, or more delicate quality, to which they are enabled by the domestic system to apply a much larger proportion of their capital. Thus the two systems, instead of rivaling, are mutual aids to each other, each supplying the other's defects and promoting the other's prosperity.

This extract is interesting in showing how clearly the committee saw the general principles of business in their application to commerce and trade; but how little were they able to foresee the effects that were about to be produced in the field of industry by the adoption of the joint-stock method of financing enterprises, and the application of steam power, and the factory method of handling labor in manufacturing processes.

The dates marking the changes during the last part of the second transitional period and the important influences which brought about the disintegration of the

domestic system may be summed up as follows for the textile industries. Other industries soon followed.

- (1) Before 1770, early experiments with inventions.
- (2) 1770-1790, development of great mechanical inventions.
- (3) 1790-1830, application of steam power.
- (4) After 1830, development of transport facilities and growth of the market.

CHAPTER II

DEVELOPMENT OF ORGANIZATION (*Continued*)

10. *Factory system*.—This is the system under which the modern industrial world moves. It is hardly saying too much to credit it with giving color to modern civilization. When we speak of our times as being the industrial age, or say that our religious, political and social institutions are dominated by the commercial spirit, we have reference to the conditions and influences that have been brought about under the “factory system.”

The changes that began to take place under the domestic system during the latter part of the Eighteenth Century were carried on during the Nineteenth Century. The substitution of steam power for man power in the production of goods was equivalent to an increase of productive efficiency that would have been brought about by increasing the population several thousand times. So great was the output that the consuming capacity of the population has not yet been able to overtake the productive capacity of the people. For this reason, each of the great manufacturing nations is striving to protect its home market and to push its surplus into those countries where modern industrial organization has not yet penetrated. That is, the problem of modern business organization is to maintain and win new markets for its product. Nations were able during the period of the domestic system to win new markets by conquest and colonization. They held these markets

by a policy of colonial administration which compelled the colonies to consume and to export only those goods that permitted the "home country" to dispose of its surplus stock most advantageously. England's attempt to enforce this policy in America brought about the War of Independence, and the influence of its outcome brought a change in colonial administration throughout the world. Although much can still be done by a nation in advancing its foreign trade, yet in its last analysis the success of the business man must depend upon his resourcefulness in producing a cheaper and a better article than his competitor.

11. *Coöperation and centralization.*—The first great advance in the direction of cheapening production was the invention of a machine that would do the work of several men. The next step was the improvement of these machines, and much is still being done in this line, but the technical efficiency of a machine may be counterbalanced by many other considerations. The machine may be situated at so great a distance from the source of power that the cost of conveying the fuel or other medium may be greater than the sum saved by using mechanical contrivances. So business men saw the advantage of moving the machine near to the coal fields and water falls. And then too, they put the machines under one roof instead of having them scattered about in the homes of the working men. This brought the laborers under one roof. The accumulation of a large amount of capital and the assembling of a numerous body of workers under the direction of a central management constitutes the essential part of the reorganization which business underwent in shifting from one system to another. These form the foundation upon which the modern industrial organization was to rear itself.

The use of machinery was accompanied by a greater division of labor and hence, greater coöperation. The business unit considered as a combination of capital and labor has increased in size, and the two components have assumed such entirely new relations to each other that many of the most pressing problems of to-day depend for their solution upon a method which will make them coöperate more effectively and harmoniously.

12. *Effect upon the laborer's status.*—In order that this relation may be seen clearly by the modern employer of labor, the present laborer's position may be compared with the earlier handicrafts-man. Before the introduction of steam power, the workman owned his own lathe, or hand loom and so on, he applied his own muscular force, and he guided and directed the implements or tools according to his skill and sentiments. By a series of economic changes he lost possession of the tools but still furnished the skill and muscle necessary in the production of goods. The next step in the divorcement of the laborer from his work was to supply an independent source of motive power which removed the tool from the direct guidance of the individual and made him a "machine tender" rather than a craftsman. This is an important step, for the relation of the laborer to the work is changed from a direct to an indirect relation. He still coöperates but neither the skill of his hands nor a feeling of proprietorship in the machine or the product is left to give him a personal interest in the outcome.

With the shifting of the machine from the home to the factory there was a still further break in the interest of the laborer in his work. As the business unit grew in size, the laborer felt his growing insignificance. Not only was he separated from any direct interest in the machine, but the increasing of the productive process

was putting him farther and farther away from any contact with the men who were directing the business policy of the concern.

As the early handicraftsman was forced from the market by the increase and growing complexity of the demand for goods and grew suspicious and rebelled against the middleman who furnished the capital and assumed the risks of marketing the products of his labor, so the artisan to-day is forced from a direct connection in production. Other men furnish the capital, direct the business policy and manage the processes of production. The laborer feels his dependence and looks upon his coöperator capitalist with suspicion and distrust. To meet the power which capital exerts in the business, the laborers have combined into "trade unions," and after a long struggle they have established their right to speak as a body in the interests of the individual members. They have made great progress along this line by substituting the method of "collective bargaining" for the old method in which the individual laborer stood alone in bargaining for his wage with the employer. At present the unions support the claims and demands of their members.

To restore some of the advantages which existed under the simpler forms of industrial organization, many of the large establishments of to-day are adopting methods of payment such as profit sharing, as well as plans for the better housing of their employés, and various devices for improving their condition while at work which is termed "welfare work." The object is mainly to regain that personal touch between employer and employé which was lost in the complex business organization of to-day. These will be treated of later as a part of the business policy of an enterprise. It is mentioned

here simply to show how these modern problems of business are connected with the larger industrial development.

The increase of production due to a better organization of the essentials contributed by labor was accompanied by a continual improvement in the character of the machine.

The economic advantage of the early machines consisted chiefly in the economy of working in combined action a number of similar tools by the agency of a single motor.

The more highly evolved modern machinery generally represents an orderly sequence of processes by which mechanical unity is given to labor once performed by a number of separate individuals or groups of individuals with different sorts of tools. But the economy of the earlier machines was generally of a different character. It consisted, for the most part, not in the harmonious relation of a number of different processes, but rather in a multiplication of the same process raised sometimes to a greater size and more speed by mechanical contrivances. So the chief economic value of the earlier machinery applied to spinning consisted in the fact that it enabled each spinner to work an increased number of spindles and performing with each the same simple process that he formerly performed with one. In other cases, however, the element of multiplication was not present, and the prime economy of the machine consisted in superior skill, regularity, pace or economy of power obtained by substituting mechanical direction of the tool for close and constant human direction. In modern machinery the sewing machine illustrates the latter, as the knife-cleaning machine illustrates the former.¹

13. *Producer as a business man.*—The chief directions in which the business manager applied his energies in order to reduce the costs of production and to increase

¹ Hobson, "The Evolution of Modern Capitalism," page 46.

his output was as mentioned above. But non-human power and the machine called for large outlays of capital. This was supplied by the constantly increasing surplus due to more efficient production under the factory system. The capital, however, was scattered and men were not as yet experienced in the ways whereby these capitals in various forms and in sundry places might be brought together, thus affording a large accumulation under a single management to be used in some one industry. This was the problem set for the business men of the last century. In 1800 the principal form of a business enterprise whereby the capital of more than one man might be used in the promotion of industry was the partnership. This form was fitted to the conditions of earlier systems although its limitations were manifest when the great commercial and trading companies were organized in the seventeenth and eighteenth centuries. Many men were willing to invest a part of their capital, provided by so doing they did not endanger the remainder of their possessions through the risks of the venture or the speculations of the partners. The partnership form of organization did not permit such men to dispose of their capital, since the essential principle of the partnership is that each member is liable to the extent of his whole possessions, and is bound by the actions of his partners.

The increasing wealth of both nations and individuals forced the business man into a consideration of means whereby it might be used as capital in further production. He saw that increased production and cheapened costs which depended simply upon new inventions and the application of a non-human power would soon reach their limits if there were not combined with these the advantage of "large scale production." Under this

method the business man utilizes his space and time to the fullest advantage. The more goods he can turn out upon a given space and in a given time, the less heavily do the ground rent, the interest charges, and so on, fall upon each unit of goods. He saw also that the same policy applied to his wage costs. If a laborer could attend four machines with the same effort that he could watch two machines, then the costs per unit of output would be lessened very materially by providing more machines and increasing the output. But a business policy of this kind called for the accumulation of larger capitals. It could not be supplied by one individual nor by the joint-stock of a few individuals which the partnership form of organization permitted.

It was evidently time to extend the operation of the joint-stock principle as found under the partnership by removing the restrictions of unlimited liability imposed upon business associations of this kind. Accordingly joint-stock companies were permitted to organize under the law. Each member was limited in his liabilities to the amount of his capital investment. In England, these companies were known as "limited companies," while in the United States they are spoken of as corporations.

Although according to the recent researches of Deloume and Weber the commercial corporation probably existed in the later centuries of the Roman Republic, in its modern shape it dates from the early medieval Italian cities. The earliest form was that of a so-called "bank," individuals associating their capital to form a joint-stock, loaning it to the government on a pledge of certain revenues, and participating in the profits according to their holdings. Thus the beginnings of public credit and of corporate enterprise are found intimately associated. The next important development of the joint-stock principle was in the

trading companies of the sixteenth century, which were at first mere temporary associations for the purpose of a single voyage, but which gradually assumed a more permanent form. It was not, however, until the predominance of industrial over commercial capital in the nineteenth century that we find the immense expansion of corporate enterprise which marks modern life.¹

To the above economic advantages may be added that of perpetual life. Unlike the individual firm or the partnership which must be changed with the death of a member, the corporation never dies until the business is liquidated. "The shareholder may disappear but not the shares." This permanency of life enables it to plan for the future. The "to-morrow departments" of large industries of the present can plan with the assurance that there will be a business successor or inheritor who will carry out its plans with ability, or if needs be, who can wisely adjust the policy to altered conditions.

14. *Trusts, or unions of corporations.*—During the last half of the Nineteenth Century the advantages of united capital became so apparent that large scale production developed into gigantic scale production. In order to meet the demands for immense accumulations of capital, it became expedient to form corporations whose membership was made up of smaller corporations. Although there were other motives than those of economizing production through increasing the size of the business unit, yet this is still a strong argument in favor of the modern form of organization known as the trust. So important has the financiering of modern corporations become that it is separated from the productive end of the business and given a distinctive department.

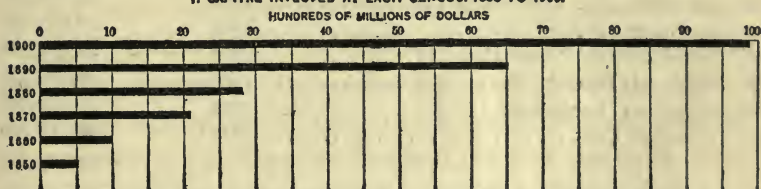
¹ Seligman, "Principles of Economics," page 96.

The raising of capital by the marketing of securities is treated in the volumes of this series entitled **CORPORATION FINANCE** and **INVESTMENT AND SPECULATION**.

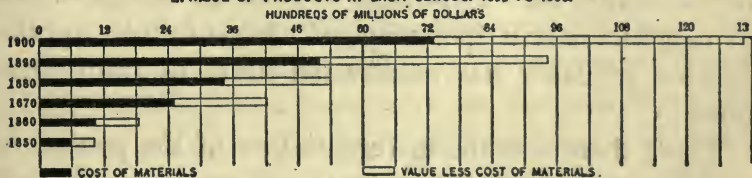
In no country has the increase in capital been so rapid and vast as in the United States. Hence it is here that we should expect to find the greatest tendency toward the organization of industry in large establishments. Beginning in 1812, we find some concentration on a large scale, but it was not until 1850 that the machine supplanted hand work, and not until 1865 that large scale production became the prevailing type of industry.

The following diagrams from the Reports of the Twelfth United States Census Statistical Atlas will give some idea of this vast capital increase during the second half of the 19th century and also a comparison of the cost and value of products. The next table of a few important industrial companies shows the growth of combination.

1. CAPITAL INVESTED AT EACH CENSUS: 1850 TO 1900.



2. VALUE OF PRODUCTS AT EACH CENSUS: 1850 TO 1900.



<i>Name.</i>	<i>When founded or reorganized.</i>	<i>Capitalization, Outstanding Stocks and Bonds, 1915.</i>
1. United States Steel Corporation.....	1901	\$1,496,270,578
2. American Telegraph & Telephone Co.....	1885	504,186,900
3. American Tobacco Co. (Old Company)....	1904	97,644,702
4. International Mercantile Marine.....	1902	178,092,457
5. American Smelting and Refining Co.....	1899	160,534,500
6. Amalgamated Copper Co.....	1899	166,387,900
7. International Harvester Co.....	1902	70,000,000
8. Pullman Co.....	1899	120,000,000
9. Central Leather Co.....	1905	108,762,231
10. American Agricultural Chemical Co.....	1912	62,249,600
11. United States Rubber Co.....	1892	128,932,800
12. Mackay Companies.....	1903	91,380,400
13. American Sugar Refining Co.....	1891	90,000,000
14. Corn Products Refining Co.....	1906	88,445,367
15. American Can Co.....	1901	96,466,600
16. Pittsburgh Coal Co.....	1899	90,226,056
17. General Electric Co.....	1892	118,532,200
18. Colorado Fuel & Iron Co.....	1912	81,393,500
19. Lackawanna Steel Co.....	1902	70,000,000
20. Westinghouse Electric & Mfg. Co.....	1872	28,070,250
21. Republic Iron & Steel Co.....	1899	66,124,000
22. American Car & Foundry Co.....	1899	60,000,000
23. American Woolen Co.....	1899	60,000,000
24. International Paper Co.....	1898	55,466,500
25. National Biscuit Co.....	1898	54,040,500
26. American Locomotive Co.....	1901	57,729,000
27. Deere & Co.....	1911	62,217,000

15. *Division of labor.*—The mass production which was possible only with the advent of the machine has been furthered by the specialization of labor. Mass production is thus correlated to labor as closely as it is to capital. From the point of view of industry this division of labor has manifested itself in four directions.

First, there was the differentiation of the process of making a living between man and woman. The division of society into social classes is a result of the

working of this principle. The military class, the priesthood, and the industrial classes are examples of these social groups.

Second, it took ages for this elementary division of labor to take place, but the efficiency gained by society was so great that the same force has been operative within the various classes themselves. The great industrial class is the only one in which we are at present interested, and it is here that we find the best examples of the division of labor, especially among the textile industries. It was in this field that the earliest of the inventions was applied. This start in industrial development has been maintained and the operation of the great industrial force can be clearly discerned. For instance, certain mills manufacture yarns; others do only the weaving; and still others dye and prepare the cloth for the trade.

Third, we find within each of these branch industries a still further refinement of this specialization. Each business has its technical processes divided into separate classes. This means that certain groups of workmen apply themselves to one machine process while other groups are likewise limited, each to some one kind of labor. Thus the modern factory discloses perhaps hundreds of separate processes all working to turn out a completed article which in former times was made entirely by one man. To make a shoe in some factories requires nearly two hundred operations each conducted by a separate class of operators. In the manufacture of a high grade watch there are more than one thousand kinds of machines each with its different set of laborers. The advantage of this kind of specialization is obvious but the extent to which it is carried in the manufacture of the commonest articles is often overlooked. For ex-

ample, the horse-rake has three hundred parts, the mower is made up of six hundred, and the binder contains 3,800 parts. If we compare this with the old reaping tool of two pieces—the handle and the blade—the development of the machine and the consequent division of labor are very evident. The close connection between specialized labor and increased output is also illustrated by the manufacture of reapers. In one year the McCormick Company turned out 56,000,000 castings. This company devotes one department solely to the making of chain-links, and the output runs to nearly sixty million a year. Another department makes more than 400,000 lynch pins per day.

This great output can only be accomplished because of the specialization of labor and the use of special machinery. The laborer, through greater familiarity with one process, increases his dexterity while the machine supplies a tireless energy and precision which man alone cannot give to it. A boring instrument in this same factory can make five holes in a casting in six minutes. It took four hours to do the same work by hand. In the paint shop one unskilled workman can paint four hundred reaper frames a day by dipping them into a great tank of paint.

The saving in the cost of production is well illustrated in the same connection. In 1845 the inventor of the reaper paid four and a half cents for one bolt. These were made by hand. To-day the company makes bolts at the rate of fifty for one cent. It was the same with "guard-fingers." Only fifty years ago these cost 24 cents each. At present, by machine and the assistance of one man, 1,300 guard-fingers can be turned out in one working day at a labor cost of six for 1 cent. Perhaps the carpenter shop offers the best illustration

of the saving which mass production is capable of giving as a result of the substitution of hand methods by machinery, and the improvement of technique through division of labor. Here, a machine that cost \$2,500 performs the single function of shaping poles. It saves only one penny a pole but this means \$3,000 a year on the 300,000 poles which it turns out.

16. *Territorial division of labor.*—There is also a fourth division of labor which is characterized by the location of the industry. Labor is applied to industry to greater advantage in some localities than in others. In large cities like New York and Chicago, the various lines of wholesale business gather in districts by themselves. This fact is so well known by New York workmen that they can tell with a fair degree of accuracy the prevailing wages, the number of hours of labor per day, the business habits of opening early in the morning or of giving a half holiday on Saturday if they know within what section the business is located. For instance, a book-keeper who wished to stop work early in the afternoon would feel that his chance for getting such a position would be very poor if he applied in the district bounded by Fourth Street on the south and Twenty-third Street on the north; Fifth Avenue on the west and Second Avenue on the east.

The reason why industries are gathered in certain localities in cities, or on a wider scale of the nation is because some places or territories are better fitted to some industries than others. Some of the peculiar characteristics pertaining to the territorial division of labor are as follows:

1. Natural characteristics:

- (a) Proximity to coal, water power, or raw material.

(b) Favorable climate.

2. Business characteristics:

(a) Nearness to markets.

(b) Cheap labor supply.

(c) Abundant capital supply.

(d) Good credit facilities.

17. *Advantages and limitations.*—That there have been many advantages which the business world has gained through its increased wealth due to the division of labor cannot be gainsaid, but the business man would go far astray in many respects if he did not recognize the limitation of the application of this principle. Many of the remedies which advanced thinkers are trying to apply to the industrial organization of to-day have to do with the evils caused by too great specialization and production on a large scale. Diversification must be supplemented by coöperation. It is in the third division of the mechanical division of labor that the business man is treated from the point of view of the business enterprise. If machine work and labor specialization simply bring to the laborer greater intensity of work, then the basis for the prosperity of the employer is unsound. The laborers of a country are also the greatest consumers. Increased output by the industries of a nation without a corresponding growth in the capacity to enjoy, and an increase in the purchasing power so that these goods may be procured on the part of the labor force, will avail the individual producer little in the face of restricted or stunted markets even with cheapened costs of production. Therefore the principle of coöperation must be adopted as a complement to the division of labor. Herein lies the great rôle of the employer of labor. He must see not only the small technical advantages, but also the advantages

which come from a wider view of the results when the whole process is considered. Organization in its broader meaning is attention to coöperative as well as to technical efficiency. First there must be coöperation between labor and capital. Then there must also be that technical combination of laborer with laborer. "Team work" tells as effectively in the factory as on the football field. Each man plays his individual part, but at the critical moment the combined effort is necessary if the result is to be of value. The great steel foundry divides its work into many sections but all parts must coöperate simultaneously or the product is spoiled.¹

Thus we see that the simple business of early times has evolved into the complex form of to-day in accordance with the same laws which rule plants, planets and political institutions. The prevailing form of organization of the present is still undergoing changes and will no doubt manifest many new features as the years pass by. It seems that the big business in the form of the corporation will be of the type to give its name to the twentieth century industrial organization.

¹ Principles of Economics," by E. R. A. Seligman, page 183.

CHAPTER III

ORGANIZATION OF THE MARKET

18. *Extension of the market.*—Not only has the growth of capital forced changes in the forms of the productive system and in the forms of legal organization, but it has also emphasized the importance of the nation as an economic unit. Commercial interests cannot follow state lines; and as the national surplus increases, trade cannot be bound by national boundaries. The foreign market is a necessary supplement to our increased productive capacity. At first it was necessary to dispose only of our surplus agricultural products abroad, but now that the country is producing such enormous quantities of manufactured goods over and above our home needs, they too must be sold to foreign consumers.

Speaking roughly we can say that business may be divided into two phases. One phase consists of maintaining a continuous flow of goods through the various processes until completed. The raw cotton finds its way to the spinners; and the cloth, after leaving the manufacturer's hands, is conveyed to the warehouse, from which it passes to the shops to replace the ever dwindling stocks. The other phase is the distribution of completed goods ready for consumption. The first phase is dependent upon the second and the latter is dependent upon the consumer. It is the strength of the consumer's demand that draws on the raw material through the various processes until it reaches the correct

form and the right place at the most appropriate time. It is very necessary, therefore, that the wishes or desires of the consumer become known to the producer with as little delay and confusion of information as possible. On the other hand, it is quite as imperative that the producer be able to deliver his goods to the consumer with each of the above attributes of form, time and place in their highest degree of perfection.

The means by which the consumer expresses his desires and makes his purchases and by which the producer gathers the information and delivers the commodities, is the market. The simplest form of the market is one where the consumer meets face to face with the producer. In this case there can be no deterioration in the character of the goods while passing from one owner to the other. Each one is able to form his judgment in conformity with his own observations, and insofar as this one transaction is concerned, the producer has placed his goods at the most economical point in space and time. Presumably, if this were not so, the place and time would be changed.

19. *Primary function of a market.*—Under the early systems of industrial organization this primary method of purchase and sale predominated. In Genoa several hundred years ago, the buyers and sellers of grain congregated around a certain stone near the docks. For many generations this served as the only market, but later something more systematic—that is, a better market organization—seemed desirable. Accordingly an association was formed, rules were adopted, and a building was erected. This was the beginning of the Genoa Grain Exchange of to-day.

With all the changes that it has been necessary to make in the organization of the market, this primary

function is still the distinguishing characteristic of every market. The strong tendency to keep this simple organization where it is possible to stem modern influence is seen in the Antwerp grain market. Here there is no trade organization other than an Arbitration Committee. It is an open and free market and all the transactions are for cash with the delivery of the actual grain. The grain trade is carried on by local interests, who meet at the Bourse every week day from two o'clock until three. At this time the buyers and sellers close the deals which they have been negotiating during the forenoon. Wednesdays and Thursdays are particularly busy days, and during this time the exchange room is crowded. All business transacted here is of a private nature. No official record of the prices is kept, as there is no organization. A merchant of Antwerp who buys a cargo of wheat in Argentina does not know when he will sell it, nor to whom; nor at what price. Any merchant who buys a bill of goods takes like chances. But it is just this element of uncertainty which has modified the organization of modern markets. That Antwerp stands unique among the great grain markets is largely due, no doubt, to her proximity to other larger markets which have been changed to meet modern conditions, and so in a measure Antwerp is enabled to use the prices of other markets as a basis for her own operations. If this were not true it would be impossible for each merchant in Antwerp to maintain connections with all parts of the world, in order to determine the chief price-making factors.¹

¹In Antwerp the following are of particular importance: Offers of wheat from the Danubian country and from Argentina, the stocks held by the millers, and the amount of wheat afloat, the movement of the grain crops in the United States and in Canada, and the amount received by such large wheat consuming centers as London, Liverpool and so on.

20. *Market prices a resultant of world-wide influences.*—The situation as it exists in the wheat trade is typical of all forms of commercial and industrial activity. Each individual enterprise connected with the wheat and flour industry has been affected by the greatly extended areas over which wheat is grown, by the improved mechanical processes, and by the organization of labor and capital which have reduced the cost of production. Men of the grain trade must watch the world conditions in order to determine the supply. On the other side, the consumer of wheat must keep informed as to the demands of other countries. In other words, the price of wheat is influenced directly and continually by world-wide influences on both the supply and demand side of the market. No longer can any local market be made up of buyers and sellers who can directly investigate the conditions controlling the price of wheat. The situation has become too complex, and with complexity and extension have come uncertainty. If producers and consumers were to give up their time to solve all the commercial riddles which modern organization presents, they would have little time left for any other business.

21. *Function of the middleman.*—Accordingly there has risen within the industrial system a class of men who are willing to devote their whole time to the gathering of information and to analysis of the conditions which it reflects. These men are willing to support their judgments of the outcome with their money. They say to the producer, "We are willing to buy your goods today at the prevailing price for the privilege of selling it in the future at the price which we believe will then exist." In other words they assume the commercial risk for the privilege of making any profit that may arise

from a change of price in harmony with their predictions. The amount of these risks varies with the trade. Some trades support a separate class of risk-takers called speculators, others have a class of middlemen who do not assume the entire risk, but owing to their training and experience are in a position to aid both producer and consumer in effecting exchanges of commodities. These men are variously spoken of as commission men, factors, jobbers, brokers and so on.

22. *Market for raw materials.*—The specialization that has followed the development of industry has made its appearance in the market also. Cotton, grain, clothing, machinery and many lines of business have each a special market. The organizations of such markets vary in accordance with the means by which the function of buying and selling can be carried on most economically. The handling of the raw materials differs from the distribution of the manufactured product. This distribution is based largely on the relation of the two classes of commodities to the consumer. The great bulk of the agricultural products is not wanted directly by the final user of these commodities. The smoker of a cigar seldom thinks of the tobacco plant or the dry leaf. The wearer of a calico dress gives no attention to the cotton field or the cotton bale. Neither of these consumers wants more than a comparatively small amount of cigars or calico at one time. Furthermore, the qualities which the buyer demands in these goods are produced by the manufacturer and these demands are subject to sudden changes. The buyers of manufactured articles seek to purchase their goods after a personal inspection and a series of bargainings. They do not meet in competition at a given time and place.

Therefore, the organization of a market that is to

meet the conditions here presented must be very different from that in the field of agricultural products. The latter are distributed to the manufacturer in great quantities. It would be a great economic loss if he were compelled to travel over a territory large enough to supply himself with the required amount and quality of raw cotton, wheat or tobacco. The miller would lose time and money if he were compelled to bargain with the farmer for enough grain to keep a modern mill running. For example, the Pillsbury A Mill in Minneapolis grinds into flour the output of more than thirty wheat farms of two hundred acres each in one day. Such a business would naturally find great disadvantages in drawing the grain from the country into a central market. Another source of demand for wheat comes from those foreign nations who wish to import grain. If it were necessary for each importer to look to the farmer directly for grain, there would be a greater economic loss than in the case of the millers. Consequently, we find the grain drawn from all quarters of the grain belt to central points convenient for shipping. In the case of the great primary grain market at Minneapolis, the demand of the local mills forms the basis for that market, while the New York market depends upon the export demand for its support. The nature of the commodity, too, aids in this method of marketing. It can be handled in bulk without injury under ordinary precautions. It can be stored away for long periods without deterioration. It lends itself readily to the business policy of buying and selling in large bulk because it is easily graded into different classes in accordance with the demand for certain standard qualities. Furthermore, where the demand is extensive enough it becomes subject to the tendency of the business men to buy and

sell for future delivery. Hence the dominant feature of all markets for the distribution of agricultural products like grain, cotton, tobacco and produce is the strong tendency toward speculation. But in each of these special markets the business man has turned over the speculation business with its profits and losses to the speculator, and he has received in return the opportunity to insure himself against unforeseen losses which arise in this direction. The result of these many factors has been to create a number of exclusive competitive markets provided with rules and regulations and controlled by a special class of traders.

23. *Market for manufactures.*—The organization of the market for the distribution of manufactured wares is the outcome of a different set of influences. It lacks the centralization of wares into a few great competitive markets, although there are well-known centers where special lines of goods are sold. There are no general rules by which the traders are governed, for they do not meet in an “exchange” to compete with each other in the buying of their goods. Articles like machinery, clothes, boots, automobiles, typewriters and so on are sent to various points at which they meet the consumer. At these places will be found the offices of the manufacturers, the jobbers and the commission men.

The organization of the first kind of market may be briefly stated to conform to the necessities of gathering the raw materials from many scattered sources for the purposes of mass production. This gives us central markets where the dealers can congregate and compete for the raw materials. The second class of markets must meet the conditions of a reverse nature. The problem of the manufacturers is to distribute their wares from large centers of production among numberless

purchasers. It is more economical to break up the market into small distributing points, and as a consequence, the manufacturer is confronted with the complex problem of devising means for reaching^o the purchasers. The various steps taken in this process give us two distinct methods, the wholesale and retail.

24. *A grain market.*—The annual receipts of grain at Chicago amount to a total of 240,000,000 to 300,000,000 bushels. Wheat constitutes from 25,000,000 to 50,000,000 bushels of the total grain receipts. This makes Chicago the greatest grain center in the world. If, however, we measure a market by the number of transactions which take place, the above figures do not represent the market. The total transactions in wheat alone far exceed the crop for the whole country, and to this is added several hundred million bushels for corn and oats. Such activity as these figures represent assures to dealers the world over an opportunity at all times to buy or dispose of any quantity of grain, wheat especially.

A peculiar characteristic of the market is that it is not necessary to ship wheat here for delivery on every sale, nor to take wheat on every purchase. It is not even necessary to take or deliver a warehouse receipt on every transaction. Contracts may "set off" other contracts and hence this peculiarity. The method has its counterpart in the banking system, where checks and drafts "set off"¹ other checks and drafts.

¹The Supreme Court of the United States holds that "set-off has all the effects of delivery." In the decision of May 8, 1905 the following decision was rendered:

"When the Chicago Board of Trade was incorporated we cannot doubt that it was expected to afford a market for future as well as present sales, with the necessary incidents of such a market, and while the State of Illinois allows that charter to stand, we cannot believe that the pits, merely as places where future sales are made, are forbidden by the law.

25. *Receiving and storing the supply.*—Although it is not necessary to make or to take a delivery of actual wheat in every transaction, nevertheless there must always be present within easy reach a large supply of wheat. It is necessary, therefore, to divide the market into two parts, (1) the place where the transactions of buying and selling take place, and (2) the departments and facilities for receiving and trans-shipping, or the storing, inspecting and grading of the grain. We will treat of them in inverse order. Chicago receives the larger part of her grain from the states to the southwest and west as far as Kansas and Nebraska, and north as far as southern South Dakota and southern Minnesota. Although the greater part of this grain comes by the railroad, yet there is a considerable volume of grain brought in by way of the lakes. Immense quantities leave Chicago for the eastern markets of the United States for Europe either by way of the railroads or in boats down the lakes.

Much grain is stored in this market by means of im-

But again, the contracts made in the pits are contracts between the members. We must suppose that from the beginning as now, if a member had a contract with another member to buy a certain amount of wheat at a certain time and another to sell the same amount at the same time, it would be deemed necessary to exchange warehouse receipts. We must suppose that then, as now, a settlement would be made by the payment of differences, after the analogy of a clearing house. This naturally would take place no less that contracts were made in good faith for actual delivery, since the result of actual delivery would be to leave the parties just where they were before. Set-off has all the effects of delivery. The ring settlement is simply a more complex case of the same kind. These settlements would be frequent, as the number of persons buying and selling was comparatively small.

“The fact that contracts are satisfied in this way by set-off and the payment of differences detracts in no degree from the good faith of the parties, and if the parties know when they make such contracts that they are very likely to have a chance to satisfy them in that way and intend to make use of it, that fact is perfectly consistent with a serious business purpose and an intent that the contract shall mean what it says.”

mense elevators. The combined capacity of all the storage facilities is estimated at from 60,000,000 to 70,000,000 bushels but from this total must be subtracted all those storage facilities that are not used for receiving and shipping and are consequently not a factor in the grain-handling business. Not including such elevators in the list, there are still about twenty-four private elevators with a capacity approximately of 21,000,000 bushels. These are really factors of the receiving and shipping business. Besides there are fourteen public elevators with a capacity of 23,000,000 bushels, making a total storage capacity of 44,000,000 bushels. These are the "terminal" elevators and their function is to receive grain for storage. They are spoken of as "public" or "regular" if they serve the public generally; and as "private" if they are devoted to the interests of their owners solely.

Chicago is also headquarters for many line elevator companies, some of which have lines of houses extending throughout the Central States, and west through Illinois, Iowa and Nebraska and southwest through Kansas and Oklahoma. The grain houses consist of the terminal elevator companies, the line elevator companies and the commission companies. The last may be divided into four classes: (1) those that transact a cash grain business only, (2) those that do both a cash grain and a "future" business, (3) those whose dealings are confined to the future markets, (4) the buyers for such interests as the big mills and for export.

The interests of the mills and exporters in the market are quite different from those of the elevator companies. The former are always buying in the open market. They never buy in the country. The line elevators buy in the country and sell in the market. The terminal

elevator companies buy in the market and sell again in the market to the mills, to the exporter or to the grain men of other cities. The commission men merely sell the grain that is shipped to them to the best customer they can secure.

26. *Inspection and grading.*—The efficiency of the systems of inspection and grading of commodities in a market largely determines the size and prosperity of that market. The inspection must be carried on by reliable and competent men and the grading must be honestly done. Unless a commodity which is not uniform in quality can be graded into classes according to those qualities there can be no organized market of wide dimensions. In the first place, the commodity could not be sold, by sample; and in the second place, all future buying and selling would be eliminated. Men will not contract to buy a commodity for future delivery unless they can be sure of getting the kind and quality which they bargained for. The difficulty of grading tobacco so that a definite contract grade could be established upon which trades for the future might be made has limited the organization of a tobacco market. It is nearly impossible to keep track of individual lots of this commodity and guard it against mixture with inferior lots in the warehouse. Therefore no one will accept a certificate of inspection indicating a certain lot.

27. *State bureaus of inspection.*—To give as broad a confidence as possible to the inspection of great staple commodities, many states have established bureaus where the inspection is done by public officials. This is true especially of grain inspection. In Illinois the State Board of Railroad and Warehouse Commissions has supervision over this feature of the business. Minne-

sota has a similar commission. A certificate of inspection under such circumstances is a guarantee of the grade by the state. This is important in the export trade of Duluth since its grades are higher than the Atlantic seaboard grades of the same wheat. European exporters, therefore, watch with care all shipments from Duluth to see that the same grain goes through the elevators at Buffalo and is loaded on the steamers in New York City without losing its identity.

The method of inspection is much the same in all markets. All cargoes loaded with grain coming into Chicago from country points are promptly reported by the railroad companies to the grain inspectors. These men visit the cars and secure samples of grain that fairly represent the grain in each car. Every car so inspected is then sealed by the inspector. The samples are turned over to the grain merchants to whom the cars were consigned from the local shipping center in the country. The grain merchant displays his samples in the market place of the exchange building and the grain is sent to the elevator. A warehouse receipt is issued upon the acceptance of the grain by the elevator company. This receipt together with the sample of grain becomes the basis for the sale and purchase of this particular amount and grade of grain. When the grain is sold, the warehouse receipt is delivered instead of the actual grain, each new owner endorsing the receipt when he receives it. If the holder of the warehouse receipt wishes the actual grain he can obtain the same by presenting it to the elevator company. Only those firms, however, can issue warehouse receipts that have been declared "regular," that is only such firms as conform to the Board of Trade rules covering the inspection, handling and storing of the grain. The warehouse receipt thus becomes a very

important instrument of trade and a heavy responsibility rests upon the superintendent of the warehouse who has charge of the grain and must keep it from deterioration either by natural or fraudulent means. The various grades must be kept distinct, although the identity of any particular lot may be lost.

The object of grading is to separate a commodity into grades based on differences of soundness, color and freedom from impurities. This applies to grain especially, but other commodities may offer other characteristics which it would be necessary to take into consideration.

Each market has its own standards and as a consequence there are many different grades. There have been many attempts at establishing a uniform grade for wheat that would apply to all markets, but without much success. The tobacco grades are perhaps the most local of the great staple products while the grades of cotton are the most uniform.

28. *Chicago and Liverpool grades of wheat.*—The following grading for wheat in a few of the large markets will illustrate the foregoing statement:

Chicago's "contract grades" of wheat or the basis for transactions in the pit, are No. 2 red winter wheat, No. 1 northern, and No. 2 hard winter. In Minneapolis the contract grade is No. 1 northern. In the Duluth market No. 1 northern is the contract grade, but No. 2 northern may be delivered on contracts at 5 cents a bushel under the price of the former. The contract grade in the Kansas City market is No. 2 hard winter wheat of not less than fifty-nine pounds, but No. 2 red may be delivered at the seller's option.

There are at least nine varieties of wheat deliverable on contracts in the Liverpool market. The wheat coming from all parts of the world as it does makes the

work of establishing uniform grades very difficult. This important business of inspecting and grading devolves upon a special committee of fifteen members elected by the directors of the Liverpool Corn Trade Association. There is perhaps no position in the business world where a man's judgment counts for more than it does in that of inspector and grader.¹ It is the grader's judgment that decides by what standard the various products shall be measured. When one considers the millions of bushels and millions of pounds of products that are entering the market—their selling power in large part predetermined by the inspector's judgment—it is easily seen what great opportunities lie in his hands for changing the purchasing power of large quantities of grain, cotton and other products—through assigning them to one or the other of a number of grades.

¹ The fundamental principle underlying all grading of commodities is to discover the dominant characteristics that give the commodity varying commercial values.

CHAPTER IV

THE EXCHANGE

29. *A typical market.*—We have thus far been treating of the external side of the market and of the various factors upon which a market of modern times must be organized. Taking Chicago as the example, we find that the various market interests not only center in one city but are focused here in one building—the Chicago Board of Trade. Technically, the “market” is at that point. “The country miller of Illinois, the grain buyer of Iowa, the elevator manager of any center, the big Minneapolis miller, the terminal elevator company of Chicago, the exporter of New York, the exporter of Argentina, and the importer of London, Liverpool, Amsterdam and Antwerp—all come here to buy or sell wheat as a ‘hedge’ against transactions in their regular business activities.”¹ To this center too come those men who wish to speculate. The market machinery is thus made use of for other than legitimate trading. At times this speculative trading is of enormous proportions.

30. *Chicago Board of Trade.*—We must now turn to the inner organization of the market—or that part where the transactions take place. The Chicago Board of Trade is generally spoken of as the Chicago market, but they are not the same thing. The Board of Trade is a corporation with officers and a definite business purpose. It owns an exchange building for the use of its

¹ Rollin E. Smith, “Wheat Fields and Markets of the World,” page 300.

members and the corporation is empowered to make and enforce rules concerning the buying and selling within the exchange, but it is in no way connected with the success or failure of the members. The original objects of the association are thus defined: to maintain a commercial exchange; to promote uniformity in the customs and usages of merchants; to inculcate principles of justice and equity in trade; to facilitate the speedy adjustment of business disputes; to acquire and to disseminate valuable commercial and economic information; and generally to secure to its members the benefits of cooperation in the furtherance of their legitimate pursuits.

The Board of Trade was organized in 1848, and in 1859 by a special act of the legislature it was given a charter. By section 4 of the act, "The said corporation is hereby authorized to establish such rules, regulations and by-laws for the management of their business, and the mode in which it shall be transacted, as they may think proper."

The membership numbers between 1700 and 1800 and includes a representative of nearly every important grain commission and elevator company in the country, many of the big millers, some of the New York Stock Exchange members, even a few European importers, several hundred local grain commission men, elevator managers, brokers, several capitalists and bankers, and owners and representatives of the packing houses. Memberships have sold as high as \$4,400, and as low as \$475, the price depending upon the demand for membership seats.

Buyers who are not members of the Board of Trade cannot transact business on the floor of the exchange themselves. They must employ a broker who is a member and must pay a commission for his services.

The rules of the exchange limit the time of trading to the hours between 9:30 A. M. and 1:15 P. M. Any deals outside of these hours cannot have the protection of the exchange.

The transactions on the exchange are of two kinds, though there are many subdivisions. There are the "cash grain" business and the "future" business. Under the former come all the dealings which pertain to the actual grain—wheat, corn, oats, etc.—selling it by sample and transferring it to some elevator for storage. One side of the exchange room is given up to this "cash" business. Here the samples are laid out for the inspection of the various buyers.

The rest of the exchange floor is given over to the future markets. The four points about which the buyers and sellers habitually congregate are called "pits." There are the wheat pit, the corn pit, the oat pit and the provision pit. During the busy time the combined markets present "a scene of activity, intensesness, seriousness and often excitement that gives the impression of impending tragedy, and which is seen nowhere else except on the floor of the New York Stock Exchange, or in the Paris Bourse. During a very active market the wheat pit is crowded with some 350 struggling, shrieking men endeavoring to execute their orders; and at such a time everyone in the exchange room seems to have a realizing sense of the importance of the momentous volume of business that is being done. It is a time when moments are valuable, and a few seconds suffice to complete transactions. This necessitates the greatest possible rapidity and alertness that human beings are capable of, physical and mental, and the aid of all the mechanical appliances that may be had. Orders are continually coming to the floor by telephone and by wire, and messengers, im-

pressed with the demand for speed, are delivering them. A large force of telegraph operators occupies one corner of the exchange room. From the time the gong sounds at 9:30 A. M. until it announces the close at 1:15 P. M., when there is an active market there is no time or thought for anything but the business of the moment. What happened a minute ago is past, and that which is to be done a minute hence will be attended to when it is reached.”¹

The pit traders are chiefly made up of representatives of the numerous commission houses. There are also independent traders who act as brokers and will execute orders for any member on a commission basis. Others still trade only for themselves—they are spoken of as “scalpers” or “floor traders.” They are speculators. The unit of transactions in the pit for wheat is 5000 bushels. When a trade is made without any mention of the amount, this number of bushels is understood. All trades of greater amounts are done in multiples of the unit. If a broker offers or bids “10,” “50,” or “100” it is understood that 10,000 bushels, 50,000 bushels, or 100,000 bushels is meant.

31. *Two classes of buyers.*—The orders received by the brokers in the future markets come from every conceivable source. Broadly speaking, however, these orders may be divided into two classes. (1) Those which are sent by men who intend to receive or deliver the actual grain at sometime in the future. They take advantage of the market which offers them an opportunity of insuring themselves against loss of profits due to a change in the price of some commodity upon which their business depends. This method of insurance is

¹ “Wheat Fields and Markets of the World,” Rollin E. Smith, page 303.

termed "hedging"¹ and is generally conceded to be a legitimate business act. (2) There is another class of orders received, however, which the senders never intend shall be filled by receiving or delivering of the actual grain. They expect to get rid of either obligation by selling on a basis of "differences." That is, instead of delivering the actual commodity which the contract calls for, the seller, for example, gives the buyer the difference between the price of the commodity on the delivering date and the price agreed upon when the contract was made. This class of orders is called speculative, as it is sent in by men who buy and sell without expecting to use the grain or even to see it. They hope to "sell out their trade" at an early date and to reap a profit by a change in price.

32. *Speculation and gambling.*—It would perhaps be unprofitable to try and classify the various grades of speculation. In one sense every trading transaction is a speculation, and the line between the "legitimate" trade and the gambling transaction is no more distinct than that which separates a bad from a good act. Much depends upon the intention, and only the man himself is

¹ A "hedge" is a sale of a commodity for future delivery in order to avert an anticipated loss through a change of price. An English miller needs wheat in February. He buys his supply in Duluth at 80 cents a bushel. The time between the purchase date (say September 1st) and the date when the wheat has been turned into flour and sold is a long one. The price of the raw material may go down to 70 cents before then, and with it, of course, goes the price of the flour. He would be compelled to sell flour made of 80-cent wheat in competition with other millers who could buy at 70 cents. To protect himself against such loss, the miller sells in September upon the Chicago market for February delivery, the same quantity of wheat perhaps at the same price as that at which he bought—80 cents. When February arrives, he again enters the Chicago market and makes good his delivery contract by buying the wheat at the market price of 70 cents. His profits in this deal equal his losses in the other, and by this process of "hedging" or "covering" (as it is sometimes called) he eliminates all risk in price fluctuations, due to raw material. He is satisfied to make his profits from the milling business, and does not care to speculate in the fluctuation of prices.

in a position to analyze this, while at times he is doubtful as to his own intentions. Still society has certain practical standards which help one in deciding what is and what is not right, and also what is and what is not gambling. In certain stages of economic development there are more necessary risks to be taken than in others. The men who take these risks by investing their capital are not generally condemned or branded as gamblers. Society benefits through the efforts of these men. The early insurance companies assumed the risks in connection with long sea voyages. Very soon, however, a class of risk takers arose who did not make good the losses due to accidents on the sea but simply used the sailing of a ship as an incident upon which "to make a bet." These men assumed unnecessary risks. What was one bettor's gain was the other bettor's loss and the fate of the ship only supplied the incident. Society gained nothing from the betting of these persons, and they were justly condemned. Many persons follow the same method to-day in assuming unnecessary risks. They simply bet on the outcome of the price movements of various commodities or securities. They do not study the business conditions or the crop situations. They simply "take a chance" blindly and ignorantly. Risks are taken which do not help society and they are condemned and branded as gamblers. These gamblers take advantage of the market machinery of the great stock and produce exchanges and thus often bring these latter into bad repute. Every purchase and sale in the pit affects prices. If the gambler supports a price which is not in accordance with the economic conditions he will ultimately lose, but his ignorant buying or selling has in the meantime given artificiality to the market, and all unnaturalness is bad. Especially is it con-

demned when such activity gives uncertainty as to the future bread supply. Sentiment of this kind has virtually eliminated this feature of future trading from the London wheat market.

33. Defense of speculation.—The exchanges have been criticised for not abolishing gambling from their midst, but the brokers reply that they cannot distinguish between the orders which they receive. Their orders are to buy or sell. If an order is supported with the requisite capital, the broker does not pretend to discover either the intention or the business method of the customer. The economic argument in support of the future trading in the wheat markets has its basis in the hedging operations of the elevator companies and the mills and other grain interests. The local elevator companies, for example, place their hedges as soon as they begin to accumulate stocks of grain. In the Northwest this happens about the first of September. Having paid cash for their wheat and put it in the elevator they order their broker to sell for December delivery. If some of this wheat is delivered by the elevator company when December comes round the hedge of course is not bought in; but the wheat that must be carried still further into the year must again be provided for. The December sale is bought in the pit and an equal amount sold again for May delivery. The number of these hedging transactions based upon elevator companies are considerably increased because of the organization of the elevator business. There are two kinds of elevator companies. Beginning with the "out-of-town" elevator companies which are buying or selling against their cash transactions in grain, there is a steady volume of hedging sales running through the months from September 1st to January 1st. But these hedges are

again bought in when the wheat is sold to the elevators in the big markets. Now when these terminal elevator companies buy the cash grain they go through the same process of hedging as did the out-of-town elevator companies. They sell in the pit against purchases of cash grain from the country elevator and buy in the pit as they sell the cash grain to millers or exporters. It is now the miller's turn to use the conveniences of the pit. Having bought the wheat in the open market from the elevator company, supposing that flour has not as yet been sold against it, they protect themselves until such a sale is made by immediately reselling the wheat in the pit. Then when flour is sold the hedge is bought in again.

The exporter follows the same methods of insuring his purchases, and the amount of such business is very large, but owing to the manipulations practiced by certain powerful speculators in some of our large markets this class of business has steadily declined.

34. *Course of an order.*—All out-of-town orders are sent to commission houses and are executed by the pit traders who represent the latter on the floor of the exchange. To facilitate this business many commission houses have branch offices and agents in other cities where orders are taken and sent to the central office over private wires. The Chicago Board of Trade offices have private wires running to Winnipeg and Minneapolis and Duluth on the north, to New York City and many intermediate points to the east, and to Kansas City, St. Louis and other points to the west and south. Orders from such sources are generally received directly by the commission house and sent to the exchange floor immediately.

35. *Two kinds of traders.*—The pit traders may be

divided into two very natural classifications—(1) those who buy with the expectation that there will be a rise in prices in the future and (2) those who sell with the hope that when the time comes to make delivery the price will have fallen, and thus enable them to fill their contracts at a lower figure than the one stipulated. These two classes are respectively called “Bulls” and “Bears.”

36. *Method of payment.*—The methods of payment in the board of trade are made to conform to the system of future trading. It would be a bungling system indeed if every purchaser had to make payment in full every time the price changed during the time the contract was running. It is possible, however, by a system of differences to make only partial payments until the final delivery is made. The amount paid over each day would therefore depend upon the price fluctuation. This is shown in the following supposed case quoted from Professor Sparling’s excellent chapter on the Exchanges in his book on “Business Organization.”

Suppose on March 10th A¹ sells B 5,000 bushels of wheat for May delivery at 95 cents. On each day thereafter this price fluctuates, and as the price rises above 95 cents, B, having the wheat, would thus be the gainer as the market advances, and A the loser; so A would pass checks to B for differences in value figured on the basis of the closing market prices each day. As market prices lower, B would pass checks to A for differences shown. Let us suppose that by April 20th the price had gone up to 97½ cents per bushel. Then A would have paid to B a total of 2½ cents per bushel, and B decides to sell to C, who finds on May 1st that the price is still 97½ cents. A would then deliver the wheat to B in the form of warehouse receipts which call for the actual wheat, and for these C would give A payment for the total on a basis of 97½ cents per bushel; but

¹ In this illustration, A might be designated a “bear” and B a “bull.”

he has already paid B $2\frac{1}{2}$ cents a bushel, so, while the wheat costs C $97\frac{1}{2}$ cents, A realizes but 95 cents for it, B having taken the difference. B is in this case purely a speculator, having judged that conditions of supply and demand would bring about higher prices, and acted on his judgment. B may have, however, sold to D, and D to C, and C to K, and K to X, of the same wheat between March 10th and April 20th, each of these traders having gained or lost as the market price fluctuated from day to day. These various parties, whether trading directly for themselves or through brokers, were thus speculators, though not one of them in selling knew whether or not he was selling to C the actual receiver of the wheat, or the genuine speculator. When B sells to D, he closes accounts, and withdraws from the transaction except as shown by the records.

37. Margins.—This method of settling differences gives rise to trading on “margins.” The broker who transacts the actual business in the pit requires of each customer a deposit of a sum of money sufficient to cover the ordinary price fluctuations. This is on the basis of so many cents per bushel or other unit of product. The broker does this because he is personally responsible to the clearing house of the Exchange, and if he would avoid losses he must compel his customer to keep up his margins. The books of the broker and those of the Clearing House record the transactions until closed. Another method sometimes employed for making final settlement is that of “ringing out.”

Let us suppose that A sells to B a given quantity of a commodity of contract grade at a price of 90 cents per unit. The ownership of this is evidenced by a warehouse receipt. The future market closes that night at 91 cents, so A passes to B a check for one cent per unit. The next day B may sell to C, and he, through others, to K, and the market closes that night at $90\frac{1}{2}$ cents. Checks are passed between all parties for differ-

ences between prices at which purchases and sales are made, with K having paid $\frac{1}{2}$ cent to J. The process continues up to X, who buys when the market is at 95 cents. Differences have been passed, until X has had to pay to W, from whom he made purchase, 5 cents per unit, and to A 90 cents per unit. In this way the ring is made complete, each trader intervening between A and X being able to secure his profit or pay his loss promptly and obviating the necessity for the clearing house.¹

38. Clearing-house.—This is the most improved method for facilitating the settlement of contracts. It resembles bank clearing-houses in large financial centers. The economic importance of the clearing-house system rests in the saving of time and friction which arise in the settlement of a large number of accounts by affording a central office and an organization of trained officials where the numerous transactions can be cleared. The clearing-house is an independent organization with its own set of officers, rules and regulations. Its function is to keep a record of the sales and to open up accounts with the exchange members.

In order to facilitate the operation of settlement of contracts by offset each member is required to keep a "settlement book," in which shall be entered the names of parties with whom settlements have been made, and the dates and terms of the trades included in such settlements, and the terms of such settlements, and the prices at which the commodities were originally sold or purchased, and the amounts due to or from him or them on each separate settlement, also the net amount due to or from him or them on all settlements.

When the business day ends the members go to the clearing house and pass in their accounts or "reports."

¹ S. E. Sparling, "Business Organization," page 140.

If the clearing house sheet as made up shows a credit to the owner of the "report" a draft for the correct amount is drawn on the clearing house. If the day's dealings have netted the member a loss he passes a check for that amount to the clearing house. The clearing house performs the settlement and obviates the necessity of each member hunting out those with whom he has made contracts during the day. In the above supposed case.

When C traded with B, then C's name appeared at the close of that day's business on the clearing-house records, and when C made an opposite trade with D, then D's name appeared on the clearing-house records, but C's obligations were closed and his name dropped. This process continued, showing always the original trader A and the last trader up to X, who, on delivery day, was shown to be the actual purchaser of the commodity. The clearing-house clerk would pass these promptly to Mr. X, and instruct him to make full payment to Mr. A, and thus become the new owner of the commodity.¹

39. Rules, regulations and management of the exchange.—So far in the discussion we have been especially concerned with the organization of the exchange from the point of view of function. It will be of interest, however, now to examine the organization's rules and regulations and management. The examples and illustrations have been those belonging to the produce exchanges, but the same general outlines apply to the stock exchanges.

The distinction between the two is only in the character of the trading. Each is composed of a group of traders who agree to abide by rules and regulations governing the sale and purchase of agricultural products or securities. The following are the chief produce ex-

¹ Sparling, "Business Organization," page 190.

changes in the world: in the United States—Chicago Board of Trade, Minneapolis Chamber of Commerce, New York Produce Exchange, New York Cotton Exchange, New York Coffee Exchange, Duluth Board of Trade, New Orleans Cotton Exchange, Live Stock Exchange of Chicago, Merchants' Exchange of St. Louis, and Richmond Tobacco Exchange. In Europe are the London Corn Exchange, and the "Baltic," the Liverpool Corn Trade Association, the Liverpool Cotton Exchange, the Manchester Cotton Exchange, the Liverpool Tobacco Market, the London Wool Market, the Bourse de Commerce of Paris, the Bourses of Berlin, Hamburg, Amsterdam, Antwerp and Budapest.

The organization and methods of these various exchanges differ in different countries, but those of the United States are all similar. The associations are incorporated under state laws. They are given power to enforce their rules and regulations in disciplining their own members. Some exchanges have powers of a judicial nature. Their charters permit them to acquire limited property. Among their most important powers is that of selecting, inspecting and grading those commodities admitted to the exchange. The certificates of such inspection are binding upon all members.

The officers who are to carry on the business management of the association and who enforce the rules and regulations consist of a president, vice-president and directors. Together these constitute the board of directors. These officers are elected by the members of the association. In the United States memberships are limited in number and are exclusive. In some of the European exchanges, however, membership is open to anyone who wishes to trade.

The president is limited in his power as the executive

head, but he can suspend temporarily any member for a violation of the rules. The board of directors is the chief authority. With them rests the responsibility for the business and financial policy, the chief appointments, the framing of the rules and regulations and the fixing and supervision of the grades. The appointments subject to the board are those of the secretary and assistant, the treasurer, the inspectors, weighers, measurers and gaugers together with the necessary working staffs. In addition to the president's power of suspension the board can expel any member for violation of the rules covering the settlement of contracts or for being guilty of "unmercantile" dealings. Any member in regular standing subjects himself to the rules if he accepts orders and acts for a suspended member. It is to this board that the warehouses must apply in order to obtain certificates of regularity.

The board appoints many committees, but only one can be mentioned here. This is the committee on arbitration. Disputes over contracts and settlements are brought before this committee. The parties to the complaints may take an appeal to the committee on appeals, where the case is reviewed. Its decision is final if the parties to the controversy have signed an agreement to abide by the decision. If not, then an appeal may be taken to a regular court.

There are also a few rules protecting the traders which it is necessary to mention. (1) A member is held personally responsible until the principal for whom he acts is made known. (2) A broker cannot designate the name of any person or firm as the principal unless the member is in regular standing. (3) The rates of commission are fixed. Of course they vary with the commodity. Members get a rate which is one-half that

paid by outsiders. In order to keep non-members from getting the benefit of the member's rates, a rule prohibits any member from "clearing" any trade not for his own account. (4) No person can represent two firms in the same transaction. This is to prevent the "crossing" of orders.

40. *Complexity of the market forces.*—In studying the market, its function and its organization, one is struck by the great number and the complexity of the influences which center here. One may well wonder how any concrete expression may be given as a resultant of all these commercial forces. Nevertheless, every moment during the trading hours, the resultant of these influences may be traced by the movement of the price. To-day, therefore, the most perfect organization for the registering of prices is found in the exchange. It is here that the keenest minds and the most recent methods of gathering and disseminating news are concentrated. That there is still much room for improvement is evidenced by the prominent place which speculation holds in the transactions, for speculation thrives on uncertainty, and uncertainty is simply another expression for lack of knowledge. The advantage that one speculator has over another rests in his more accurate knowledge. Therefore the attempts of speculators to use every means available for gathering information tend to eliminate speculation. This may be a long process, but in the meantime the producer and consumer have the advantage of timely information pertaining to the great economic factors of supply and demand. It is largely due to the speculator that modern commerce has made such large gains in those important qualities of certainty, regularity, economy and sensitiveness. The market reflects

any change from the standard set at a particular time for any one of these qualities. The telegraph and the Atlantic cable have made the markets what they are today. By their introduction the old standards of certainty and sensitiveness had to be changed. Before the first Atlantic cable was laid it cost about 3 per cent to get cotton through the hands of the commission man and the broker; but within a dozen years the charge was reduced to 1 per cent. The old consignment system was destroyed. So sensitive has the commercial world become that a cent's difference on a bushel of grain, or a sixteenth of a cent's difference on a pound of sugar, will change the course of commerce in those commodities from one side of the globe to the other. It is only through the organization of the market that such slight changes can be so accurately registered.¹

¹ Clive Day, "A History of Commerce."

CHAPTER V

MARKETING OF MANUFACTURED GOODS

41. *Attempts to develop a special market.*—Attempts have been made to organize the market for manufactured goods along the same lines as that of the produce exchanges. The Manchester cotton goods exchange is an example. Here is an attempt to put the marketing in the hands of an organized body of traders holding privileged rights as members of an association, that is, an organization controlling the inspection, grading and trading of a manufactured good. In the Manchester exchange building the manufacturers and brokers meet daily and by so doing a development of better standards of grading and more uniform values is noticeable. Philadelphia attempted to introduce a similar exchange, but so far in America little has been done in this direction. The manufacturer has sought the customer either through the wholesaler and jobber or directly by establishing branch houses and agencies.

42. *Manufacturer and middleman.*—The earlier method made use of the middleman, but the modern organization of production has compelled the manufacturer to look for means by which he may strengthen his control over the market in order to keep his productive force profitably employed. The selling organization has therefore been changed. It is no longer left to the sole control of the wholesaler. The manufacturer often deals directly with the retailer or the consumer. He can thus keep in touch with the market's demand and this

enables him to gauge his factory output. The wholesaler by his position has forced the manufacturer into a dependent position. If the middleman found it profitable to change from one line of goods to another, the manufacturer who had depended upon him for his market was left helpless. Likewise the middleman often forced unfavorable trade compacts upon the factory management.

One of the first steps taken by the competing manufacturers was to curtail the losses due to competition through a consolidation of their selling interests. Thus one sales department took the place of several, or the market was divided and all matters of common interests of the several firms were determined according to a common policy. The factories retained their own identity so far as all matters of production were concerned. Before 1903 the International Harvester Company was one of the best examples of this policy. For fifty years the harvester kings fought one another in the open market. Out of two hundred companies which had fought for market supremacy only a dozen were left in 1902. The first consolidation in the harvester business was effected in 1867.¹

Other examples of associations for division of territory are those of the former union between the Imperial Tobacco Company of Great Britain and the American Tobacco Trust, and the trade agreement between the English Sewing Cotton Company, the American

¹ After a severe reaper test in the grain field between William N. Whiteley and Benjamin H. Warder, the latter proposed to Whiteley that they quit fighting and work in harmony.

"Give me the right to make your reaper and I'll pay you \$5 apiece for all I can sell," said Warder. "It's a bargain," responded Whiteley. They did not merge their companies, but they divided the United States into three parts—one for Whiteley, one for his brother, and one for Warder. —"The Romance of the Reaper," by H. N. Casson.

Thread Company, and J. & P. Coats, Limited—in the case of the tobacco trust, each was to be left to exploit its own country, while the thread combination was to divide the cotton-thread trade of the world among them. The weak points in this form of association rest in the charges and counter charges of encroachment of the companies upon one another's territory.

Perhaps the highest organization of this kind is represented by the kartell of Germany. Here the associated firms are left to themselves in matters pertaining to production; the function of marketing the total product is entrusted to a separate organization controlled by a committee of the association. All orders are sent to the sales agency, which distributes them among the firms, reserving to each as far as possible its old clientèle and allocating new business in the same proportions as the old.¹

An example of this method is found in the association called the Central Thread Agency, which marketed the goods of Messrs. Coats, Chadwick, Clarke, and Brooks for some years before these firms amalgamated. After the union of these companies the selling association was still maintained. The relation of the association to the manufacturers was changed, for now the agency became a subsidiary company and the common ownership of the capital became the controlling factor in the management. The Standard Oil Company, the Tobacco Trust and the Sugar Trust all used this method for some years but hostile legislation compelled them to reorganize this method of selling.

43. *Agency methods of selling.*—Apart from any connection with the process of consolidation both small and large firms are extending their control over the sale

¹ "The Trust Movement in Great Britain," by Henry W. Macrosty.

of their output by establishing some form of agency. It is the common practice for manufacturers to establish branch offices at some of the most important points of distribution. These agencies may be supported wholly or in part only by the factory. If the corporation is a large one and covers a large section of the country by its sales, some central city, such as New York, Chicago or St. Louis, is selected for the main office, having as its function the supervision of the agencies throughout its territory.

These agencies may be in the form of wholesale or retail houses. The character of the trade must determine which system is adopted. The large meat packers distribute probably 99 per cent of their dressed meats and a large percentage of their packed goods through their own wholesale houses, which are established in different cities. The packers' wholesale branches sell only to retailers and not to consumers. The outcome of this policy has been to annex the local butchers to the sales departments of the large packing concerns. There are two exceptions to be noted in the above statements, and they are important since they show how closely interwoven into the system of distribution is each method and form of reaching the market. The packers put some of their packed goods on the market through wholesale grocery stores which are not owned by them; and some large buyers such as hotels are able to buy directly from the packer's wholesale house and need not necessarily buy through the retail butcher. Illustration of the growth of this practice is seen in the cases of the three largest packing houses.

The Armour Packing Company controls, all told, one hundred and eighty-two branch houses throughout the country. These are distributed over all but two of the states, and range in number from one in the

states of Delaware, Idaho, Nevada, New Mexico and Oregon, to twenty-six in Illinois, thirty in Pennsylvania and fifty in New York.

In addition to its distributive branch houses, the Company operates car routes from its various packing houses, whereby the different sections of the states are reached. These packing houses are located in Chicago, Kansas City, East St. Louis, South Omaha, St. Joseph, Missouri, and Fort Worth, Texas.

The Nelson and Morris Company likewise have a number of branch houses distributed throughout the country, just as Swift and Company, from its principal centres, Chicago, Kansas City, South Omaha, South St. Paul, and East St. Louis, controls a large number of branch houses.

Such a system as this would have been impossible before the invention of the refrigerator car and the extension of the railroad to every center of meat consumption. The "route car" has taken the place of the local slaughter house and in most cases the local butcher shop has become a distributing agent of the large packer.

Another example of direct selling, which goes a step nearer the consumer, is furnished by the National Biscuit Company. This concern is an amalgamation of several independent manufacturers, and sells most of its product directly to the retailers. They have distributing agencies in most of the big cities of the United States and deliver their goods by means of their own equipment. In this respect, however, the National Biscuit Company is an exception to the general policy followed in the marketing of grocery products. These goods are handled through jobbers, and a very slight control over the retail prices exists on the part of the manufacturer.

The motives impelling the adoption of direct selling

by the National Biscuit Company is interesting. A jobber's salesman can handle with considerable ease ten or twelve leading lines of biscuits, but when it comes to selling 200 kinds an expert is needed. The salesman must furnish much of the market experience that the merchant should possess himself, but owing to growing demand and shifting tastes the grocer is dependent upon a specialist who can supply this needed market information. The National Biscuit Company's salesmen must be able to advise the grocer what lines he should keep in stock and in what quantities, hence the salesman must be thoroughly acquainted with the popular demand and also the keeping qualities of the biscuits. The company always stands ready to take back any excess stock which the grocer may have left on his hands and instructs its salesmen in the art of "window dressing" in order that the grocery store may have expert advice in arranging its displays of biscuits.

The sale of tobacco products offers another illustration of direct selling. The American Tobacco Company sells almost all its product through jobbers, with the exception of certain sections of the South where long credits are the rule. The company has large wholesale houses in the principal cities and does the selling through them. In the country districts and small towns the company's goods are handled by local jobbers or independent wholesale grocers or druggists. These latter are very important factors in the tobacco trade and hence it is the policy of the former "trust" to avoid offending them by selling directly to the retail trade.

To meet the "independents" the "trust" pushes its business into the retail trade by stimulating the jobber. The quantity system is thus applied very effectively. By this method the jobber must buy a certain supply of

tobacco in any one year exceeding in amount that bought in the previous year. Unless he sells this stipulated amount his profits are nothing, since these depend upon the rebates or discounts connected with the system. By another method the company allows the jobber to push its interests upon the retailer. This is called the method of direct shipment. The jobber may obtain an order, but the trust ships directly to the retailer; by this means, especially if the order be a large one, the expenses may be reduced and the benefit given to the retailer through a slight reduction of cost. Another phase of the quantity system is seen in the practice of the manufacturer establishing a jobber's list. Under this practice any retailer who can buy in wholesale quantities can secure jobber's rates. The effect of these policies has been to reduce the jobbing business. To meet the attack upon their interests the jobbers have moved into the retail field themselves. They did it by establishing their own retail stores. The greatest development in this direction has been in the cigar trade, the United Cigar Stores Company and the National Cigar Stands Company being the present exponents of this multiple store policy on a national and international scale. The origin of the latter was an outgrowth of the jobber's attempt to keep control of the market. Its object is to do the buying for the drug store and generally to supervise the methods of buying and selling their cigars.

44. *Selling directly to customers.*—The organization of the selling business is not always impelled by the desire to control the market more firmly or by a wish to save the middleman's profits. The method of transportation or its costs sometimes influences the system of distribution. The chemical industries present such a

case. The proportion of weight and bulk to value in this line of goods is often very large. Consequently there is a saving in expenses if the goods can be put as directly as possible into the consumer's hands.

Whenever the quantities ordered warrant it the manufacturer ships directly to the consumer. Consequently the jobber never carries a large stock. There seems to be, however, a strong connection between dealers and customers, and the manufacturer is compelled to keep in touch with the jobber. The latter, therefore, receives a commission for all the orders sent in, and the company generally protects the jobbers by charging the outside buyer the wholesale price plus the commission. If a dealer has been appointed agent for a certain district the company credits all orders to him though some buyers may send orders independently of their agent. However, there are exceptions to this policy in the chemical trade. On the one side will be found, for example, a large alkali manufacturer who appoints one firm general sales agent, and this firm looks after the sub-agents. On the other side, there is a big firm of medicinal drug manufacturers in Philadelphia which omits the jobber entirely and sells only to retail dealers. A small reduction is allowed in the price on large orders.

Another trade that shows peculiar conditions connected with transportation is the oil business. The newer method of distributing oil is by the use of large tank cars. Only those dealers, therefore, can handle the commodity who have the necessary tank apparatus for the oil after it is removed from the car. This system has helped to displace the middleman. To-day only about 10 per cent of the dealers are outside the control of the Standard Oil Company. The majority of these

independents are wholesale grocery concerns supplying oil in barrels to a few customers. In some cases the Standard Oil Company undertakes the delivery of oil to the household consumer by means of tank-wagons. This method is adopted where local dealers are under the influence of a rival company.

A special cause for removing the jobber and "going direct" exists in the iron and steel trades. The commission agent, or jobber, was able, owing to the character of the goods, to quote a price for future delivery below that quoted by the producer. Of course, he counted on a fall in prices before it was necessary to cover his contract and often he induced a fall by his attitude, if not by his manipulation. This illustration is important in another respect in showing that speculation attaches itself easily to a commodity that has standard grades and a wide market, and a special market is not always necessary to support speculation as a factor in trading. In this case the manufacturer felt his control over the price of his product growing very weak. The jobber by quoting lower prices for a certain quality of iron set other dealers to doing the same thing. It was only a matter of time, therefore, when the manufacturer would be compelled to revise his prices. To avoid this he refused to sell the jobber and hence the latter have been decreasing in numbers during the last twelve years.

In some lines of business where the jobber is still thoroughly entrenched it becomes advisable for the manufacturer to sell directly to the retailer. Hardware is sold almost entirely through jobbers, but sometimes in order to push a novelty or a new specialty the manufacturer assumes the expense of creating a market for it. The jobber seldom objects to this, for as soon as it "catches on" the retailer must buy his further supplies

through the jobber. In the case of such mechanical specialties as typewriters, cash registers, sewing machines, etc., the manufacturer generally establishes agencies or branch houses throughout the country and by so doing brings the goods directly to the consumer.

The boot and shoe industry has been under the dominance of the middlemen so long that only in a few instances have the manufacturers been able to break away from their control and find a market themselves. Some of the stronger firms have gone to the consumer directly through their own retail stores; but where this has been impossible they have reached the retailers through their own disbursing agencies. The boot and shoe trade also illustrates a general tendency in the order of displacing the jobber. It is the finer grades of shoes that the manufacturer puts upon the market himself, the coarser qualities being still disposed of through the jobber. Thus a factory may put out a high class shoe under the manufacturer's name, while the poorer grades of shoes are placed on the market by the jobber, stamped with the latter's name. Some brands of shoes have become so well-known under the jobber's name that he can demand from the manufacturer the surrender of his own trade mark. This peculiarity has produced two interesting developments. In one case where the manufacturer refused to comply with this request the jobbers went into the manufacture of shoes on their own account. Again, one large manufacturing firm adopted the plan of doing its own jobbing because the jobbers refused to handle shoes under the manufacturer's name.

This same method is also found in other industries. Some of the independent manufacturers of tobacco place their whole output on the market through some large jobber who uses his own brands. Thus we have

the manufacturer's brand and the jobber's brand.

45. *Selling through commission houses—broker and converter.*—The textile industries display more varied forms and methods of marketing their products than most other lines of business. Some of the principal factors determining the organization of the selling methods are the extent of territory over which the sales must take place and the method of financing the factory operations. Cotton, woolen and silk factories show different degrees of approach to the direct method of marketing goods. The middlemen in the cotton and woolen trade are the commission men, the brokers, the jobbers and the converters, the last having functions belonging both to the producer and the middleman. The converter takes the rough weave or "gray goods" and converts them into grades. If he is buying on his own account the goods are then turned over to some finishing house where the bleaching, folding and coloring takes place. The converter generally has a New York office as this is the market for printed goods.

The commission men are supported in these trades principally for two reasons. In the sale of cotton goods the buyers are so scattered and the distances so great that it is hardly possible for the mill to have its own salesmen. In the sale of the yarn, the spinners, especially in the South, are financially weak and they rely upon the commission houses to furnish them with capital; and again, although yarn is a simple thing to sell, nevertheless there is economy in having one firm of commission men deal with a manufacturer of cotton goods. The latter must buy more than one style or kind of yarn and he prefers to do this by dealing through one firm rather than through several. But the strong tie between the spinner and the commission men is the financial one.

However, as the spinners of yarn become financially stronger there is a tendency for them to break away from the commission house and to employ brokers in finding a market.

The broker's business is to bring the buyer and seller together; he receives for this a brokerage of $1\frac{1}{2}$ to 2 per cent. He is not as yet a strong factor since comparatively few goods are sold this way, and these are chiefly of the kind that are of comparatively high grade. The print cloths of Fall River are the chief line of goods sold in this way.

The commission business, on the other hand, is a very essential part of the system. In many of the textile industries the manufacturers have had barely enough capital to supply the factory needs, let alone the selling end of the business. They have relied chiefly on advances made by commission houses. This applied to both the New England and the southern mills until recently. The method of advancing money is done by allowing the manufacturer to draw drafts against consignments to the commission house, amounting to from 70 to 90 per cent of the value of the goods. The former are now becoming more independent. In contrast with the broker, therefore, we find the commission house performing several functions. They store the goods, advance money on them, sell them in their own name and guarantee payment of the accounts to the manufacturer. The commission man's income is represented by a 5 per cent commission, interest on advances, an allowance for insurance and a bonus of one or two per cent in the form of a discount.

In the silk business considerations are different. The territory to be covered is not so extensive nor is the trade so scattered. Accordingly it is possible for the

big mills of Paterson and Jersey City to have their own selling agencies in New York City, where the buyers of the country may come to make purchases. Wherever it seems advisable to put salesmen on the road, the companies do not find it impossible to cover the territory since the buyers of silk goods are limited in number as compared with the market for cotton goods.

The woolen mills stand next in dispensing with the commission house but as yet only the larger mills have established selling agencies of their own, and these like the cotton factories are for the disposal of the finer goods. A change in the demand for ready-made clothing has helped the development in this direction since it concentrated the buying of woolen cloth. When tailor-made or home-made clothing was the prevailing kind of wearing apparel, the buying was scattered and the market was difficult to cover. Now the output of a whole mill can be taken by some of the large ready-made clothing establishments. Similarly in the case of carpets the manufacturers sell their own product directly to the jobbers or the large retailers. This is especially true in Philadelphia. One of the most notable examples is that of the American Woolen Company which has dispensed entirely with the commission house and sells directly to the wholesalers and the manufacturing clothiers.

Other examples are those of the makers of textile specialties, such as the shirt, collar and cuff manufacturers of Troy, N. Y. In the hat business several of the largest firms have offices in New York and other central cities. The J. B. Stetson Company also employs a force of traveling agents to visit the retail traders throughout the country.

46. *Mail-order method.*—In regard to the mechanism

of direct selling it is well to remember that it is only one of the means whereby the manufacturer attempts to control the market. So far we have taken only the various agency forms of going directly to the wholesaler or to the final consumer. There is, however, another method of reaching the market directly from the factory, and that is by the "mail-order" method. In this case the catalogue, the newspaper, the magazine and various advertising schemes invite the buyer to send directly to the factory, and the manufacturer sends back the filled order through the post, by the express company or by freight. In the list of industries following this method may be found ready-made clothing manufacturing, furniture making and boot and shoe manufacturing. This method is not confined to the manufacturer but is adopted by some of the largest distributing firms. The largest of these are Sears, Roebuck & Company and Montgomery Ward & Company, of Chicago. These houses deal in a large assortment of goods and their business is strictly retail by mail. No goods are sold over the counter.

The development of this system in both the United States and England has been hindered by outside factors. In the United States the parcel post system has only recently been introduced. In England the "cash on delivery" practice introduced into this country by the express companies has never become established; and without this practice the parcel post is not half so efficient a factor in distribution. This obstacle in England is difficult to overcome, since it involves changing the trading custom of a whole nation.

The extension of the "mail-order" business is also opposed by the local retailer for in most cases it means his elimination even more effectively than was the case

when the large department store was introduced. But the "mail-order" house must always be handicapped by the distance to be covered and the consequent delay in filling the orders, as well as its dependence upon the strictly cash terms.

47. *Manufacturer's retail stores.*—In reviewing the methods of direct selling by the manufacturer one is impressed by the increasing growth of the retail stores owned by or controlled by the manufacturer. It might be well therefore to examine this development more closely. In dealing with the subject it might be more convenient if we classify the retail stores established by manufacturers. In the first place it should be noted that certain products are virtually excluded from this method of selling. Such, for example, is sugar. The character of the demand for this and like commodities compel a system of distribution which meets the great mass of consumers at every point possible. This is best done through the ordinary dealer. If on the other hand the product is such that the customer will seek it in some particular district, then the manufacturer may be able to stand the expense connected with the establishment of branch stores for the retailing of the goods. Specialty goods, such as the typewriter and others mentioned above, come first under the classification. Accordingly we find these products sold in retail stores and exclusive agencies owned by the manufacturers. Connected with this method are the local repair departments. One large camera company markets its whole product through the exclusive agencies.

In the case of boots, shoes and hats we have a different class of direct selling. The distinction is marked (1) by the fact that the retail store is devoted solely to one line of goods, and (2) by the fact that these stores are located in shopping districts. The exclusive boot

and shoe store was a feature of the distribution system before the manufacturer entered the retail field. He simply carried the narrowing process a step further by limiting the stock carried to his own brands, excluding all other lines of shoes. The principal firms following this method are the Walk-over, Douglas, Regal, Crawford, Emerson and All-America Shoe Companies. The W. L. Douglas Shoe Company maintains eighty exclusive stores and the Regal Shoe Company very close to fifty. These companies present only examples of tendencies, for if the boot and shoe trade be taken as a whole it will be found that the great bulk of the business is done through jobbers scattered over the United States. One advantage which these large companies gain by "going direct" is that the advertising which they do on a large scale helps the company directly and permanently.

The acquirement of retail stores by the American Tobacco Company was the outcome of a policy to meet competition. At first the company sold to retailers with certain restrictions. For example, the retailer was forbidden to handle certain competing goods like cheap cigarettes. He was also forbidden to quote his own prices. It was not until 1901 that the American Tobacco Company began to fight for the cigar market. Up to this time they had left this trade to others. Business policy forced the company to gain control of the Cuban output, but they found the independent companies in possession of the market for cigars. The trust at once began a policy of marketing its own product through its retail shops and distributing houses. The subsidiary company through which the selling was conducted was the United Cigar Stores Company, which to-day has over nine hundred stores. It is now an

independent company. Although its stores are carefully selected as to location—a corner or a frequented business section—nevertheless many important sites for this trade were already occupied by drug stores. To reach these centers the American Tobacco Company formed two smaller companies. The first was to provide drug stores with cigars and fixtures at a cheaper rate than they could be obtained from competing wholesale companies. This was the National Cigar Stands Company. The second subsidiary company—the United Cigar Stands Company—was to obtain possession of the small candy store, the newspaper stand, and other minor points of distribution. Since the dissolution of the American Tobacco combination these subsidiaries have become independent.

The chocolate and candy market is reached much after the same method as that of the tobacco trade. The manufacturers make use of their own retail stores and also those of the general candy trade. Thus "Hüyler's" keeps a partial control over all its products. It has about sixty stores of its own located in the larger cities; but where it must go outside and distribute through the general trade, the company sells its goods only in sealed packages.

Sometimes large concerns keep a retail shop or two going for the purpose of advertising, and sell the bulk of their product through the ordinary channels of trade. Large publishing houses often carry on a retail trade in New York and other large cities; John and James Dobson own a shop in New York, where their carpets are kept on display and for sale; the Gorham Company of Providence, R. I., maintains a retail store in New York City for the sale of silver and bronze ware.

48. *Reasons for the declining importance of the mid-*

dleman.—The movement of the manufacturer toward emancipating himself from the control of the middleman is bringing several important changes in its path. One naturally points to the decreasing importance of the jobber and wholesaler in the distributing business. This man who once usurped the title of merchant prince is gradually giving place to the industrial prince. The agents that have brought this about are advertising, traveling salesmen, quantity buying (the complement of mass production), financial policy, the agent and the sub-agent and the mail order system. The manufacturer has found it necessary to supplement his mass production with quantity selling. He was compelled to relieve a system of continuous factory production by means of a steady and constant absorption of the product. The increasing capital outlays for the plant made it essential that its value should not be put in jeopardy by being separated from the source of that value, i. e., the market. The manufacturer furthermore was under the pressure of the same competitive system which forced consolidation of interests in the productive field and which now persists in forcing still further the economies of combination by demanding a like consolidation in the field of distribution.

All these demands are met by the manufacturer by attempts to reach the market as directly as possible. By knowing and studying the market he could gauge the production of his mill. By advertising, by established trade marks and trade connections he secured a firm hold upon his customer's good will, an asset often more valuable than his patents. In passing around the jobber, the wholesaler and other market experts, he is in a better position to ascertain the true nature of the demand for his goods. A jobber by placing a big or-

der with the factory, in one year may induce the manager to lay out large sums for the extensions and improvements; the next year the jobber may demand concessions which if not met will result in his placing that year's orders with a rival factory. Such uncertainty places industrial capital of this kind in great jeopardy. In a sense the way for this re-organization of the manufacturer's selling methods was prepared for him. The retail establishments themselves had grown to large dimensions while the organization of transportation and communication and storage made it possible to place large orders without the aid of the wholesaler. Quantity selling was met by a retail market capable of quantity buying. The benefits of this direct connection between the producer and large retailer are divided between them. The manufacturer establishes a jobber's list and where the retail dealer can buy in quantities he gets the advantage of the wholesale prices. It is natural that the jobber should make a struggle to maintain his ancient position in the market. He is putting forth efforts in two directions. In some lines the wholesaler is maintaining a favorable advantage over the retailer by forcing the manufacturer to grant him more and better discounts. This is often done by powerful associations of jobbers which dictate terms to the manufacturer. In another way the commission men are protecting themselves by buying into the manufacturing business and becoming producers themselves. This is especially noticeable in the cotton goods business.

The effect of the competitive forces was first made manifest in the establishment of agencies by the manufacturers. These, as we have noticed, were often subsidiary concerns. Although they formed a necessary function in the mechanism of direct selling yet this is

not the sole use to which such a subsidiary company may be put. The subsidiary aspect of the agency coupled with a name which did not disclose its connection with the parent company, gave the big corporation an opportunity to escape taxation by arranging that the subsidiary company which had branches in different states should have only a nominal capitalization and in case a question of monopoly should arise, the subsidiary company would act as a buffer to successful investigation on the part of the government. Again, as has been pointed out, a central selling agency enables a number of nominally independent concerns to market their goods jointly or it enables a combination of firms, which had made reputations before the consolidation to market the old brands as before without the usual fear of competition or loss of identity.

The marketing of manufactured goods, although lacking the security and economy given by the organized exchange, is showing the effects of the universal tendency in the business world, the elimination of unnecessary factors and the greater economizing of efforts and costs through better organization.

CHAPTER VI

ORGANIZATION OF EXPORT BUSINESS

49. *Necessity for seeking foreign markets.*—Business problems in the United States have usually been limited to those connected with home trade. But with the rapid growth of our manufacturing surplus American business men are becoming interested in foreign markets. Most American manufacturers know very little of this kind of trade and much provincialism is displayed by those who attempt to enter a distant foreign market for the first time. On the other hand, some of our exporting houses have built up organizations that compare favorably with those of England or other commercial countries of Europe. Such enterprise and organization as are displayed by the American companies handling sewing machines, typewriters, talking machines and cash registers may well serve as examples, not only to other American exporters, but to the rest of the world also. The Eastman Kodak Company has not only invaded European markets as a selling agency, but by adroit manipulation of companies established in England, France and Germany, has made large profits from its financial arrangements.

The progress of our methods in winning the favor of foreign customers is illustrated by the agricultural machinery business. The early method of introduction of these goods was by means of a public test during some exposition or agricultural show in London, Paris, Berlin, Vienna, etc. Two of these tests will serve as

examples of all the earlier methods. At one competition near Paris in 1879 three reapers were set to work in fields of equal size. The French reaper led off and finished in seventy-two minutes. The English reaper followed and finished in sixty-six minutes. Then came the American machine which completed its stretch of grain in one-third the time of the English reaper. Another of these tournaments, which did much to advertise the United States, took place in England in 1880. The American reaper sent over by the McCormick Company met with mishaps at sea that injured its appearance and left it rusty and unfit for work. Cyrus H. McCormick, Jr., who had it in charge, determined to turn its forlorn aspect into an asset. Instead of improving the machine's appearance, all the paint was scraped off and the smallest and scrubbiest pair of horses procurable were attached. However, the experts did not fail to oil and adjust in a proper way all the running gear. "The next day" as Mr. Casson relates the story, "five or six foreign reapers were on hand, each glittering with newness and drawn by a stately team of big Norman horses. The shabby American reaper arrived at last and met a shout of ridicule as it rolled into its place. But in the race 'Old Rusty' as the spectators called it, swept ahead of the others as though it were an enchanted chariot, winning the gold medal and an enviable prestige among British farmers."

50. *Modern methods of reaching foreign markets.*—To-day all this is changed and the American manufacturer of farm machinery disdains to consider expositions and trials, and if any attention is given to them it is by agreement among the various firms, and any action determined upon is decided by a flip of the coin. The American binder and reaper dominates the foreign

market. The shipment of these goods is now in cargo lots and the manufacturers have organized the agricultural districts of Europe along the same effective lines that obtain in the United States. Their general agent and their sub-agents, their block men and their mechanical experts, are to be found eagerly and intelligently pushing for new business, developing the old, and handling both with tact and with satisfaction.

How recent is the entrance into the foreign trade by some of our largest corporations, is brought to mind by the constant newspaper reports of the "trade agreements" regarding steel imports and exports between the United States Steel Corporation and some European iron and steel company. It is only within the last few years that the greatest iron and steel concern in the world has taken an active interest in the foreign market that would in any way compare with the farm machinery companies.

The experiences of such well-known firms as those mentioned and others, such as the large meat-packing companies, certain steam pump, steam-heating and electrical machine manufacturers, are not the only examples of American attempts to establish an export business. But few American manufacturers have formed a correct estimate of the difficulties to be overcome in invading a foreign market. It should first be realized that Europe's share in international trade is and always has been immensely greater than the share of the United States. It is for American merchants to fight for a position already in the hands of competitors, and—which is no less important—to meet in the open field new and fast developing commercial nations. Russian shops recently secured one-half of the contracts awarded by the Italian government for freight and passenger cars, and

this, too, in competition with the home and German bidders. Spain is selling in the Indian market, cotton undershirts made of American cotton, while Japan stands ready to monopolize the eastern markets the moment the commercial spirit makes itself manifest in China and Eastern Asia generally.

51. *Direct relations with foreign buyers.*—It is the opinion of successful export houses that it is not difficult to obtain sample or trial orders from foreign countries. The real difficulty is in holding the relations once established. The method by which a manufacturer should approach the subject of exporting is outlined by Mr. B. Olney Hough, editor of the *American Exporter*, as follows:

(1) Secure a "paper acquaintance" with foreign countries, capitals, seaports and commercial centers as a foundation for a broad and thorough cultivation of export markets. These may be secured from a good atlas, map and a gazetteer, and incidentally with the aid of geographies, guide books, books of travel, and even steamship folders. By such study certain physical limitations will be suggested, but the manufacturer should always be open to conviction. The invasion of Europe by American-made boots and shoes is an illustration of a successful venture which was undertaken in the face of very discouraging competitive conditions. Last year the exports of this line of goods amounted to over three million dollars.

(2) Advice should be sought from other manufacturers in the same line of business and from professional exporters. These men have had practical experience in many lines and in many countries. They have met the foreigner both at home and abroad and can give valuable information about the chief markets of the world.

(3) Having acquired a knowledge of the world's markets and of what other manufacturers are doing in exporting simi-

lar goods, the next problem is: In what markets will his goods have the best opportunity? He may gain this information in three ways: (a) by sending a traveling salesman, (b) by advertising, (c) by direct correspondence with possible foreign customers.

(4) Names of merchants and importers in different cities may be obtained from a variety of sources. For example:

(a) Directories are available—city, country and world directories. No foreign country has carried directory-making to such perfection as the United States, and in foreign classified trade lists many important merchants are likely to be omitted. They may appear, however, in the book under another caption.

(b) Lists of dealers in a particular line of business may be purchased from firms who make the compiling of such lists a business, but lists of addresses more than a year or two old should be discarded.

(c) Men who have traveled or lived in foreign markets can often supply information about leading merchants and local trade papers. The publishers of these sheets are often willing to supply names of local dealers.

(d) "Rating books" are seldom found outside of the United States. Only one English publication seems to enjoy the general confidence of exporters. This book is sold only to bankers and is limited in its scope.

(e) New York foreign bankers can supply valuable credit information and this is freely given after proper introduction.

(f) The various commercial agencies in the United States, although their charges are high, are able to give information leading to knowledge of a firm's financial position.

(g) The local "information bureaux" at the homes of the foreign correspondents can often direct attention to the comparative importance of certain foreign merchants.

(h) Most of the larger importers in all of the world's principal markets have certain American connections established from whom references are quickly obtained.

(i) The American consuls in foreign lands, although they

are neither drummers for American goods nor reporting agencies, may nevertheless be in a position to advise a manufacturer in the introduction of his goods.

(j) In a restricted sense the Bureau of American Republics is an institution for supplying trade information about different American countries.

(k) The United States Department of Commerce, through its consular and other reports, gives timely items concerning foreign countries the world over.

In considering the above sources of information it is well to bear in mind their limitations and the fact that only after long study can information so gained be utilized. One feature found in some parts of the world, especially in the Far East, most parts of Central and South America, and very frequently in Australia and in South Africa, is that the greater part of the import business is handled by general importers. They are spoken of in the trade as "merchant" or "indent" houses.¹ In the parts of the world we have just spoken of, the smaller dealers do very little importing on their own account, but fill their orders through the general importers. This is an important fact to be borne in mind. The manufacturer attempting to make business connections in China or Central America would not make progress by obtaining lists of names of the actual dealers in his line of merchandise. The men to seek are the general importers who are likely to be interested in his goods.

52. The importance of clearness in foreign correspondence.—The first essential in foreign correspond-

¹ A "Merchant house" is a concern that buys goods in quantity on its own initiative and then seeks to dispose of them to the trade. An "Indent house" takes orders for certain goods from dealers on sample or otherwise, then imports for the benefit of its customers.—B. O. Hough, "Elementary Lessons in Exporting," page 6.

ence is simplicity of style. The goods should be described and explained in a way that will be understood by a person completely ignorant of them. For example, a manufacturer of children's stockings quotes a certain grade and size at \$1.05 per dozen, with a "rise and fall of 5 cents" for every half size larger or smaller. Outside the United States only a few dealers would understand this. Prices are seldom quoted by European manufacturers. The metric sizes rather than the English are customary in most European markets. All names of goods and names of parts should be examined before using the terms in a letter, since it may be the case that the American name is purely a local one and not generally understood. This applies to catalogues especially. Clearness and simplicity from the foreigner's point of view is to be aimed at. Help may be had in doing this by a study of the literature sent out by foreign manufacturers along the same lines. Mr. Hough estimates that probably 50 per cent of our machinery catalogues, and even more than that of our special lines, are almost incomprehensible to any readers outside the special trade to which they apply. He cites the following instance: A trained mechanical engineer, holding a diploma from one of our first American technical schools, together with a thoroughly competent American agricultural engineer, jointly studied for two days over the directions for setting up an American hay-press six thousand miles from the factory, and finally gave up the problem in disgust. On appeal to the manufacturers, a sarcastic letter was received, which gave no advice at all, necessitated another letter and a further delay of six weeks before the machine could be made to work.

Another caution to be observed is in connection with

the introduction by catalogue of new goods. If catalogues are written from the American point of view, they will be as so much "Greek" to foreign readers. The export of cement block machines is an example. The catalogue goes into great technical detail and reads as if the author thought that the conditions in all countries were identical with our own. As a consequence, a large percentage of this foreign correspondence is without effect.

The importance of attaching a distinctive mark of quality should not be overlooked in foreign trade. These customers show far more respect for names and marks than Americans. A trade-mark once established needs little pushing thereafter. For a similar reason a personal letter to a foreigner is always more effective than a circular letter. Then, too, the best results are obtained when letters or catalogues are written in the language which the recipient uses. Imitation typewritten letters with names and addresses inserted are so perfect nowadays that it is difficult to distinguish them as "process" letters. These form letters can be put into several languages at a small charge. In the case of catalogues it is well for the American exporter to use at least one other language than the English, preferably the Spanish. Furthermore, it is not necessary to have the foreign edition an exact duplicate of the domestic edition. It can be shortened by leaving out all articles that have a home demand alone. Some large firms have two distinct catalogues. One is large and complete and is meant for important and regular customers, the other is a cheap booklet for general circular use.

The manufacturer should be careful to secure a competent translator when addressing correspondents in a

foreign language. Many men make this work their specialty in the large export centers, and the cost of their services is not high. The following list indicates the country and the language to be used in correspondence with foreign houses. Spanish literature can go to South America, Cuba, Porto Rico, the Philippines, Spanish and Portugese colonies, such as the Canaries and the Azores; French literature can be used in France, Belgium, Italy, Greece, Turkey, Egypt, Algeria, Portugal and Brazil; German literature in Germany, Austria-Hungary, Switzerland, Scandinavia, Russia, Roumania and Bulgaria; and English and Spanish literature combined will cover the rest of the world.

53. *Quoting of prices.*—How prices should be quoted in the export trade is a debatable question. There is a general agreement, however, that the manufacturer should make a study of his particular line of trade in order to discover whether it is wise or not to quote prices in his catalogue. It is well to remember that the one price system in vogue in America and England is not so highly esteemed in other countries. A graduated scale of prices, therefore, may meet several contingencies that arise in the export trade. There are (1) the prices of the wholesaler and retailer; (2) the possible progression of trade from a retail to a wholesale business; (3) the forced advancement of prices; (4) the practical question of "taking care" of export commission houses, which is more easily solved if prices to the buyer are elastic.

The revision of prices is considered very bad business policy unless it is done with a great deal of care. "Nothing," says one authority, "is surer discouragement to foreign buyers than to tender orders on the

basis of manufacturer's quotations and have their orders returned to them with the statement that prices have advanced. Tying a string to a quotation in the shape of the provision that all prices are 'subject to change without notice' is very far from meeting the requirements of export business, where buyers are located sometimes four and six weeks' mail time distant."

In this connection it may be well to mention that prices quoted in dollars should include the proviso that exchange is for the account of the buyer, or that invoices will be drawn in sterling (or other foreign currency), conversion to be made "at day's rate of exchange when making shipment," and in case of shipments to Latin American countries where "dollars" are also used, quotations should specifically read "gold" or "United States currency."¹

Two other precautions to be particularly observed have to do with quotations that specify conditions of shipment, and underpaid postage. The abbreviations C. I. F. and F. O. B. refer to "cost, insurance, freight" and "free on board" respectively. The first is added to the F. O. B. ocean steamer, but it should be quoted so that C. I. F. includes the customer's nearest port.

Manufacturers in the interior of the United States would avoid much friction if they observed the difference between the terms F. O. B. New York and "Freight paid to New York." The foreign correspondent assumes that F. O. B. excludes all charges before the goods are put on board ship. The transfer charges from the railway station to the ship are often very high and the exporter should specifically state that these are to be paid for extra if he wishes the charge to be included in the foreign merchant's bill. In this case the

¹ "Elementary Lessons in Exporting," B. O. Hough, page 20.

term "Freight paid to New York" is the proper one to use and not F. O. B. New York.

It is difficult for most Americans to realize that foreign business men are peculiarly sensitive to small outlays imposed upon them, such as extra expense for mail matter delivered to them with underpaid postage. Perhaps there is no surer way of never getting an order from a foreign firm than to be careless in thus sending out letters or catalogues. Much of this is due to careless stamping by the office boy or stenographer. Some firms avoid this by writing a large letter "F" in the right hand corner of the envelope. This calls attention to its character when going through the hands of the mailing clerk.

In addressing foreigners, it should be remembered that they are more accustomed to formality in correspondence than Americans. Their practice should be respected. It may seem cumbersome to substitute the formal French and German termination of a letter, "accept, gentlemen, the assurance of our profound esteem," for the terse "yours truly," but it is business in the one case as much as in the other. The Frenchman likes formality, the American prefers brevity.

The following simple vocabularies of a few expressions used in foreign trade names will aid the exporter in filing and indexing names or in addressing foreign customers.¹

GERMAN.

Sohn (Singular)	Son
Söhne (Plural)	Sons
Bruder (Singular)	Brother

¹ Hough, "Elementary Lessons in Exporting," page 25.

Brüder or Gebrüder (Plural)	Brothers
Aktien Gesellschaft (abbreviated A. G.)	
.....	Joint Stock Company
Handelsgesellschaft	Trading Company

FRENCH.

Frère (Singular)	Brother
Frères (Plural)	Brothers
Fils (both Singular and Plural)	Son or Sons
Société Anonyme (abbreviated Soc. Anon.)	
.....	Joint Stock Company
Compagnie (abbreviated Cie)	Company

SPANISH.

Hijo (Singular)	Son
Hijos (Plural)	Sons
Hermano (Singular) abbreviated hno.	Brother
Hermanos (Plural) abbreviated hnos.	Brothers
Sociedad Anónima (abbreviated S. A.)	
.....	Joint Stock Company
Compañía (abbreviated Cía)	Company

SWEDISH.

Son (Singular)	Son
Söner (Plural)	Sons
Bröderna	Brothers
Aktiebolaget (abbreviated Akt. or A. B.)	
.....	Joint Stock Company
Kompaniet	Company

ITALIAN.

Figlio (Singular)	Son
Figli (Plural)	Sons
Fratello (Singular)	Brother
Fratelli (Plural) abbreviated Flli	Brothers
Società Anonima (abbreviated S. A.)	
.....	Joint Stock Company
Compagnia (abbreviated C.)	Company

54. *Export commission houses.*—The prime economic function of the commission man is to put goods where they are most wanted at the most suitable times. The changing organization of the other parts of the industrial system outside the field of exchange has varied the duties of the commission man from time to time. He has generally usurped those parts of the distributive system which the producer or consumer deemed too far beyond their own time and energy to be considered. Standing thus between the producer and consumer, the commission man's business partakes of the nature of an agency. He sells for one and buys for the other. If his interests are chiefly centered in finding a market for the manufacturer, he is called a manufacturer's agent; if his interests are devoted to the finding of goods for a consumer or another firm in a foreign country, he is termed an export commission man. The importance of the commission house depends largely upon the duties which it performs as an intermediary. As has been mentioned above, both the producer and consumer are continually encroaching upon these functions as they find it more economical to do so. To-day, however, the export commission house may be defined as a buying agent in America for foreign merchants. It combines

with this function the business of shipping the goods and of financing such orders—that is, paying the manufacturer out of its own resources and in turn collecting from the foreign merchant. These export houses seldom buy any goods until they have received orders for the goods from their foreign customers. With the development of the export business there is a tendency for these houses to extend their functions by going into the foreign field for the purpose of inducing merchants to buy through them. In such cases the export house either sends its own traveling salesman or establishes its own branch offices in foreign markets, often opening up a sample or sales room. In other directions the functions of the commission house have been modified. Some manufacturers avoid the export commission agent by sending their own representatives abroad; others operate through agencies which take a limited number of manufacturers usually in the same line of trade. These agents act for their principals upon a salary or a commission basis, or the two combined.

The greatest encroachment upon the functions of the commission house, however, has been from the direction of the big foreign concerns which take large quantities of American goods. Branch offices are maintained in New York and other market centers, and through them all orders for American goods are executed. This movement toward personal representation has been very marked of recent years and illustrates very clearly the tendency manifest in all departments of industry, to combine as many activities as possible consistent with economy and efficiency under a central control.

In treating of the export commission house as generally accepted by the trade and as defined above, it is well to distinguish between those who confine their opera-

tions to certain parts of the world and those who do not so limit their operations. Each of these classes contain some houses which do a special line of business and others which receive orders for any sort of American goods, from any foreign house of assured standing.

We have spoken from the American point of view and have generally referred to New York City as the type of a market center; but it should not be supposed that export commission houses are not found in other countries. In fact, London is the real home of the world's commission houses. Here are found five times as many as in New York City. All the big continental market cities, such as Hamburg, Rotterdam, Antwerp, are each as well supplied as is New York City, which has about six hundred export commission houses.

There is little in the *modus operandi* of the export commission house that is difficult to understand. They do business only with foreign houses whom they know, and, as a rule, ship goods subject to draft attached to documents or against confirmed credits. In some cases where the export house is also an import house, the exchange of commodities permits the commission firm to arrange the financial settlement in a different manner.

The advantages, both to the buyer and the seller, which are offered by this method of distributing goods may be briefly stated. The advantages to the foreign customer in dealing through a commission house may be summed up as follows: (1) He can forward all orders under one cover instead of dealing with a large number of separate manufacturing concerns; (2) he receives his shipments on one bill of lading; (3) his payments are to one person and not to many; (4) a foreign firm may get longer credit extensions from a commission house, that is, the exporter being acquainted with

the trade and having a wider connection among foreign banks, would not hesitate to grant longer term drafts.

The advantages to be derived by a manufacturer may be similarly summarized: (1) The export house carries out the shipping details; (2) the export firm is a home concern which can be easily investigated if its financial strength or commercial standing is at all in question; (3) collections can be enforced according to American laws; (4) the commission firm is in a position to secure better ocean freight rates, or in any event to avoid the excessive charges incident to small shipments by individual manufacturers.

55. *Cautions to be observed in dealing with commission houses.*—Certain cautions in dealing with commission houses should be observed, for there are not only untrustworthy firms, but the character of foreign trade itself breeds sharp practices and offers many pitfalls to the ignorant and the unwary.

It should be recalled here that a commission house does not originate orders and offers only a few facilities for introducing a new firm's goods into foreign lands, also that these export firms handle a great variety of goods, in fact everything for which a profitable market may be found. The representatives of the commission house must of necessity scatter their efforts and can not know the "ins and outs" of every business. Among those export houses that have foreign branches in many markets there will be found great differences in ability to handle special lines of goods. For example, a large export house has its own branches in Shanghai, Buenos Ayres and Sydney. The Shanghai house deals in staples like cotton piece goods and wire nails; the house in Buenos Ayres devotes itself entirely to engineering lines of goods for constructional work, while the Sydney

branch handles miscellaneous lines, such as hardware, boots and shoes. While this concern would not refuse to handle the goods of a boot and shoe manufacturer through its Buenos Ayres establishment, a manufacturer could undoubtedly find a rival commission house whose standing and influence in the same market would be much greater in the boot and shoe business. A manufacturer should satisfy himself first as to the business which a commission house is doing in a certain market; and, second, what the possibilities are of introducing his wares satisfactorily. It is not enough to know that the New York house has a big reputation; this may have been gained in lines of no interest to the manufacturer in question.

Furthermore, in this connection an export house that solicits the "exclusive agency" of a manufacturer should be judged by the facilities it has in different markets for handling this particular ware, and not by its claims to a world-wide influence and connections. Many houses will solicit an exclusive agency for the whole world. No wise manufacturer will expect to get satisfactory returns if he grants it. No commission house can do justice to a line of goods covering so broad a field. Not only should a manufacturer be on his guard against extravagant propositions, but also against downright misrepresentations of marketing facilities. Letter heads are cheap, and vague representations suggest great possibilities, but by never giving definite references, or locations of their "numerous branches scattered over the world," they are easily composed. Every such solicitation and representation or claim should be thoroughly investigated by the manufacturer.

56. *Evil of substitution.*—Perhaps the oldest evil connected with the export commission business is the prac-

tice of substitution. The commission house receives an order from a foreign firm. Instructions are enclosed showing from what American manufacturer the goods are to be procured. Instead of filling the order with the goods, the commission house selects another manufacturer of similar goods and ships a substitute. This is done because the commission house can probably get special terms from the manufacturer. The cure for this practice rests with the principals in the transaction. If a foreign house should send duplicate orders to the manufacturer at the same time it orders through the export firm, a sufficient check would be imposed against this abuse. Manufacturers should urge all foreign customers to do this.

57. *Bonus*.—Competition among commission houses has given rise to another abuse. Business for foreign clients is done on a 2½ per cent commission basis. Commission men claim that this is too small. They therefore supplement the buyer's commission by a "bonus" from the selling manufacturer. This division of the expense between buyer and seller would assume a different ethical aspect if it were surrounded by different conditions. The commission house solicits private discounts and commissions from the manufacturer. This the export house appropriates to itself. Sometimes the case is reversed and the manufacturer offers special discounts in return for the export firm's good will. These facts in themselves are not unjustifiable, but they have another appearance when taken in connection with the claims of the export commission house that all discounts, cash, selling and every other form of rebate shall go to the benefit of the foreign customer upon the payment of the stated 2½ per cent, or less, commission.

58. *Foreign sales arrangements*.—The export com-

mission house is really the agent for the foreign buyer in America. The American manufacturer seldom trusts his goods to agents located in foreign markets. He does, however, work through the export commission house. This is done directly as has been already described, and indirectly by maintaining his own agent, the manufacturer's agent, who keeps in touch with the export commission house with hopes of receiving their orders. Manufacturers located in the interior are using this means more and more. Some firms more enterprising than the others are extending their activities into the foreign market. Four methods are used in putting their goods upon the market: (1) through local merchants or "jobbing" houses; (2) through foreign resident commission agents; (3) by means of salesmen sent out by American manufacturers; (4) through their own branch houses established in foreign markets.

59. "*Jobbing*" houses.—The first method has the advantage of securing a representative who is interested in the manufacturer's wares because he has a personal interest in the profits. The manufacturer should weigh against this the practices that have grown up around this form, especially where the merchant or "jobber" has been given exclusive control over any considerable territory. Self interest has often induced the merchant to take a competitive manufacturer's goods and push them where a more favorable price could be obtained. Often, where the American wares have attracted trade by their novelty, the merchant has had a similar article made by some home manufacturer at a cheaper price and has gradually substituted the latter for the former. Having an exclusive control over the American article he can easily maintain the appearance of selling it by send-

ing in a few orders now and then, for the sake of keeping American competition out of the field.

60. *Foreign commission agents.*—The second method is not a favorite one with Americans. They hesitate to intrust their interests to unknown agents. As a very unsatisfactory class of agents has developed in this field, manufacturers should examine the references of such agents with care. In nearly every country except the United States an order is a contract, and the agent according to the laws is also authorized to collect moneys. A manufacturer may provide that orders tendered by agents be accompanied by bankers' references. This will show the financial position of the customer and help the manufacturer in forming a judgment of his credit reliability; or he may demand that a draft be attached to documents. Many houses use commission agents to develop trade among the minor tradesmen. By having a reliable agent on the ground many small individual orders can be shipped and financed together. The manufacturer in such cases draws directly upon the agent who attends to collections and the delivering of the goods. Such drafts are generally dated so as to give the agent time to make his collections before meeting payment on the manufacturer's draft.

61. *American salesmen abroad.*—The third mode of establishing a manufacturer's goods in a foreign market embodies the personal representation principle. The salesman should therefore be selected with much care. His personality will be a strong factor in making desirable and permanent trade connections. The American "drummer" type seldom succeeds. A competent judge in this matter estimates that fully 80 per cent of American salesmen who visit foreign countries to introduce American goods return home complete and dismal

failures, no matter how satisfactory a record they may have established in our own country.

Personal representation in the foreign field is so important, however, that many manufacturers make frequent trips themselves. Many foreign markets lie at the manufacturer's door, as Canada and Mexico, but it costs but little to visit the principal European markets. Four hundred dollars will cover the expense of a four weeks' trip abroad.

62. *Branch houses.*—In the larger markets where it is necessary to keep up an established business as well as to develop a new trade, the fourth method is considered a very desirable one, even if it is confined to an establishment's sales agency. This method permits foreign customers to fill orders without delay or the formalities connected with long distance ordering, and to order in small quantities. The branch house also impresses the customer with a feeling of security in the responsibility of the distant firm. Mistakes and disputes are easily adjusted and redress effected without the delay which a long tedious correspondence entails.

A modification of the above method is frequently adopted by firms whose foreign trade does not warrant the expense of maintaining a branch house alone. Therefore several non-competing houses unite and put their trade into the hands of a "combination" salesman. This method is particularly popular in England and Germany. When these agents keep stocks of goods and collect money, the firms represented in the "combination" frequently require bonds of the salesman.

A still further adaptation of the branch house method is to establish one main office in a centrally located market and put it in charge of all the other sub-branches. London is naturally the great center for these houses

since it is in more direct touch with the different parts of the world than any other city. Of course the more indirect the connection between the consumer and the manufacturer, the greater the expense and the greater too is the opportunity offered for mal-practice which is detrimental to both the manufacturer and the consumer. How the line of dependence is organized may be seen in the following examples. Importers in Switzerland order through an agent in Germany who has charge of the continental business; he in turn orders through the London branch which has general charge of the European trade. The London agent finally places the order in the hands of the American manufacturer.

How some of the prominent American manufacturers work through their European branch houses is described by Mr. Hough thus:

A large American manufacturer of steam-heating apparatus puts his general European business under control of his British branch. This branch, however, quotes prices in two different ways. Carrying a stock of goods in England it quotes for prompt shipment from England to European points, prices 10 per cent in excess of similar prices quoted for shipment direct from the factory, which latter prices are invariably the same as would be quoted by the factory itself. Ten per cent advance demanded for shipment from English stock is thought to be justified by the expenses incurred in carrying stocks, and proves acceptable to many European buyers, especially when very prompt delivery is required. A large American manufacturer of steam pumps has agencies established in all the principal European capitals. Stock is carried at each agency subject to the general control of the main branch in London. Once a month a stock list is published of all goods on hand in each one of the different agencies. This list is put promptly into the hands of each agent so that each one is not only posted as to goods in his own

stock, but as to pumps of other sizes or descriptions which are available at other agencies, and in case a special pump, not in the agent's own stock, is required at once, a telegram can be dispatched to the nearest brother agency, where the pump of the desired description is available and the apparatus received in the shortest time possible.

CHAPTER VII

CONSULAR SERVICE

63. *Purpose of the consul.*—Among the public trade-promoting institutions we may include the consular service. A consul is really an agent for the promotion of commercial intercourse between the country he represents and the one in which he lives as consul. Consular service is largely a business organization and should therefore be managed as a business department. Until recently the American people have been so busy with the development of the vast home resources that they have had little occasion to be interested in the representation of their interests abroad. But the growth of foreign commerce has given rise to a demand for a better consular service. The United States is to-day an exporter as well as an importer, and this fact has stimulated all forms of business activity.

The consul is not necessarily a diplomatic officer, who is concerned mainly with political relations. The consul is a commercial agent acting in an official capacity. Sometimes, however, the duties of the two overlap. The consul may help greatly in administering the tariff law, particularly in certifying consular invoices and sending out reports on commercial subjects. In 1856 annual reports were for the first time sent out, and in 1881 was begun the issue of monthly reports which have been supplemented since 1897 by daily commercial reports.

64. *Brief history of the American consular service.*—

The American consular service was created primarily to protect the lives and property of United States citizens abroad. This grew out of a still more primary desire to protect American shipping. The first consul was appointed in 1780, but no laws regarding this office were passed until 1792. In this year (1792) consuls and vice consuls were appointed, while in 1801 consular agents appeared, and in 1856 consular clerks. In 1854 the title of consul-general was used for the first time and since then the number of offices has increased steadily. Until recent years little attention was given to the fitness of appointees to the service. Politicians, unsuccessful business men, or persons who wanted to give their children a foreign education, were often given consulates. The United States has come to realize that she must improve her consular service if she is to reap the benefits of a more wide-spread commercial prosperity for her own people.

65. *Present system governing consular appointments.*
—In 1906 a new system was inaugurated for the purpose of procuring more efficient consular officers. This was amended in 1915. A Board of Examiners, consisting of the Secretary of State, or a designated officer of the Department of State, the Director of the Consular Service, the Chief of the Consular Bureau, and the Chief Examiner of the Civil Service Commission hold examinations for admission to the consular service. This is open only to applicants between the ages of twenty-one and fifty, who are American citizens of good habits, and who are qualified physically and mentally for this work. They must have been designated by the President of the United States for appointment

subject to examination. The examinations are also for student interpreters who are to be stationed in the Orient, for the purpose of studying Chinese and Japanese to aid the consulate in interpreting these languages. Interpreters must be unmarried, and between the ages of 19 and 26. They are to remain in service for ten years.

The examination is written and oral, and an average of 80 per cent must be obtained in both. The subjects for the written examinations are: one modern foreign language; the natural, industrial and commercial resources of the United States in relation to foreign trade; political economy; elements of international, commercial and maritime law; American history, government and institutions; political and commercial geography; arithmetic; European history and the history of the Far East since 1850. The oral examination is for the purpose of determining the character, alertness, and general information of the applicant; his natural fitness for the service, his command of English and his general education.

Those who pass a creditable examination are appointed to the eighth or ninth grade of consuls, or they may become vice or deputy consuls, clerks or student interpreters. Those serving in the department of state with annual salaries of \$2,000 or more may be promoted to any grade of the consular service above the eighth grade. Vacancies in offices above the ninth grade are filled by advancements from lower grades. Political views are to play no part whatever in appointments and promotions. The test is to be efficiency. Successful candidates are placed upon the eligible list for two years. There is also a system of inspection which gives the government detailed reports of every United States

consular officer. Besides, there is an efficiency record which determines advancement.

66. *Grades and salaries in the consular service.*— There are five classes of consuls-general and nine classes of consuls. The distinction between the two ranks is not sharply defined. The salaries of some consuls are greater than those of some consuls-general. The consul-general is placed at the head of a consular district and he has supervisory authority over other consular posts. This office is known as a consulate-general, and to it belong a vice and a deputy consul-general and one or more consular clerks. Then there are consular agents who report to their superior officers but make no direct reports to the government.

There are at this time 276 consuls and consuls-general with salaries from \$2,000 to \$12,000 each. No consul is allowed to engage in private business, nor is he to practice law. He must, however, perform service as a notary. All fees are to be paid into the treasury, his salary being his only compensation. The following list of divisions and salaries is according to the present law:

CONSULS-GENERAL.

Class	I.	(2 in all)	.....\$12,000
Class	II.	(12 in all)	..... 8,000
Class	III.	(5 in all)	..... 6,000
Class	IV.	(14 in all)	..... 5,500
Class	V.	(22 in all)	..... 4,500

CONSULS.

Class	I.	(1 only)	..... \$8,000
Class	II.	(2 only)	..... 6,000
Class	III.	(8 in all)	..... 5,000
Class	IV.	(13 in all)	..... 4,500
Class	V.	(25 in all)	..... 4,000
Class	VI.	(44 in all)	..... 3,500

Class VII.	(58 in all).....	3,000
Class VIII.	(52 in all).....	2,500
Class IX.	(29 in all).....	2,000

67. *Consular reports.*—About a half century ago, following the example of France and England, consular officers were encouraged to make commercial reports. It was found that a good way to promote foreign trade was to collect material abroad of a commercial character in the interest of navigation, commerce, agriculture and manufacturing. The monthly consular reports are sent to educational institutions, libraries, and the general public, while the daily reports are sent mainly to newspapers, commercial bodies and exporting and manufacturing firms. Since 1890 a series called “Special Consular Reports” has been published. These are collections of articles on special subjects prepared in the form of printed circulars for consular officers. Some of the titles are: “Cotton Textiles in Foreign Countries,” “Malt and Beer in Spanish America,” “Insurance in Foreign Countries,” and “Streets and Highways.” Some of these articles have been distributed widely in the United States, where they are occasionally in great demand. In the *Commerce Reports*, issued daily, we find a greater definiteness and exactness in detail. These concern foreign customs regulations and tariffs; local demands in various markets; local styles and habits; reports on crops; reports on foreign business methods in respect to credits, means of sale and packing; and foreign food and patent laws. Following are some of the considerations discussed in the daily and monthly reports: Tobacco in

France, The Mining Industry in Africa, American Trade in Mexico, The Sugar Industry in Cuba, Flour Milling in Italy, Seeking Trade in Canada, Musical Instruments in China, Reaping Machinery for India, Olive Crop Reports, and so on. In the article on "Seeking Trade in Canada," the following subheads are briefly treated of: "How to increase American trade in the Dominion," "Mail Orders and Advertising," "British and German Trade Efforts," and "Prices of Farm Machines." In an article on "American Trade in Switzerland," the cause of the small number of sales in the Republic is discussed, as well as what the commercial traveler sells in Switzerland. In another article called "Burma as a Trade Field," these subheads appear: "Opportunities for Increased Sales of American Products," "Imports and by Whom Controlled," "American Sales Methods at Fault," and "Methods for Increasing American Trade."

A knowledge of foreign customs regulations and tariffs is of great importance to the importer and exporter. Recently the consular reports have referred frequently to any new requirements. Besides helping out in any formal difficulties that may arise, such as failure to pack things separately and specifying exactly what is in the packages, the changes in tariff schedules enable the exporter to figure out more exactly his margin of profit. For instance, the following bit of information found in one of the later monthly reports would be of very practical interest to an exporter of sterling and plated silver and gold ware to France:

Sterling silver is difficult to import from the United States on account of the government control, as each piece of silverware must be stamped by the government officers, and a tax per

weight is paid for control. Silverware that has not the stamp of the government control cannot be sold, and none is permitted entry from abroad unless it passes through the *controle* and pays the stamp tax. The same may be said of all articles of gold.

Then follow extracts from statutes in detail, giving the exact taxes and requirements for the sale of this class of articles.

The necessity of international protection of patents is often emphasized in the reports. Often an American article has been imitated by other nations and sold, which practice has interfered greatly with the American trade, as in the case of the sewing machine in Brazil, where it was sold by German manufacturers. Valuable service, too, has been rendered by the consuls in protecting American trade marks and patents when registered abroad.

Nearly every issue of the reports has some reference to the regulations concerning the preparation of foods for foreign markets. Many of the laws restrict the importation of American fruits and meats. Some of the rules are only formal ones for the purpose of protecting the local trade, while others are in reality intended to protect the public health. In Germany there is a law which prohibits the importing of fruit dried on zinc frames which is probably simply a measure to restrict the American competition. In Canada no patent medicine is allowed to be sold if it contains cocaine, or alcohol in excess of the amount required as a solvent or preservative, or if it contains any drug, of a long list submitted in the consular report, which is not printed conspicuously on the label and wrapper of the bottle. This latter measure is probably really intended for the public health.

68. *Foreign needs and prejudices.*—One decidedly important feature of the consular reports is the very frequent reference to the demands of the local markets. Upon the accuracy of this information depends much of the success or failure of the American export business. Until recently the exports from the United States to Hong Kong were almost exclusively flour and kerosene. But now that the local demands and the methods of carrying on business in the East are better understood, there has been a considerable expansion of trade with these countries. Exporters are taking up every suggestion much more seriously than before. Some years ago, an exporter of tinned goods found that a good part of his shipment had been rejected apparently without any reason. Upon investigation, it was found that the rule in China was to open every case, remove the wrappers and examine every tin. If a label was in the least blemished the tin was rejected. The exporter must either comply with these rules or lose his trade, for the Chinese guild listens to no argument and is decidedly autocratic in carrying out its rules. This instance shows the importance of having full and correct information on such matters.

Americans have often been criticized for not paying sufficient attention to local styles and prejudices in the export trade, and for that reason have sometimes been left far behind while Germany and England have succeeded admirably in introducing certain articles of export especially in many of the backward countries where local preference is often groundless. It is not that these people are prejudiced against American-made goods; it is simply that they do not know of them or that the goods are not exactly what they want. The Germans send reliable and capable salesmen who speak the lan-

guage and understand the customs of the particular country to which they are sent, and these generally succeed in introducing some line of goods which conforms to the native ideas. Report after report emphasizes the importance of sending a good salesman who speaks the language and who does not expect to succeed without a strong effort. Too many houses expect to succeed in introducing a new article by simply sending out catalogues and price lists.

To illustrate the conservatism of various countries we may cite a few instances from the consular reports of various years. It would do no good to attempt at present to introduce mutton, or butter or cheese into Japan, as the Japanese have no taste for these things, while cotton seed oil would probably find a good market as would condensed milk. The Chinese and Japanese want distinctive native patterns in cottons, and the English in conforming to their taste by actually copying designs of old Japanese art upon their fabrics have succeeded admirably in this line of export trade. The Samoans want gaudy patterns in cotton goods; in Hayti mauve is popular; in West Africa the men wear flowing white gowns and the women gay calicoes and velvets. In Cuba there is a good market for cheap white canvas shoes and low cut tan or russet high heeled shoes in rather small sizes, as the Cuban has a small foot. In Asia Minor the people are gradually disposing of their ancient costumes and there is now a market in Smyrna for American ready made clothing, especially the cheaper grades of men's suits. The Dominicans prefer a good grade of dressy soft or vici leather shoes; the women especially like low fancy strap slippers and sandals with beaded ornamentation. There is no market in France for American silver plated ware unless the de-

signs are of a type familiar to the French purchaser, who desires classical styles, such as Louis XV and XVI, Empire, and so on. In Germany it would do no good to try to sell American silver plated spoons and forks, as the Germans favor a different style—narrower, longer and more pointed bowls in the spoons, and longer and more slender prongs in forks.

The consular reports sometimes mention shortage of crops in foreign countries. Occasionally there are opportunities for starting an export trade on this account. When the shipping is once started it is apt to go on indefinitely. After the apple shortage in Tasmania not long ago, large supplies of American cold-stored apples were sold in Europe and Australia.

69. *Foreign credits.*—Another thing of importance to the exporter is a knowledge of foreign business methods. Consuls have furnished valuable information as to local practices of granting credits as well as to methods of collecting debts. This is a typical paragraph found often in the consular reports: "A manufacturer who demands cash in full at the port of shipment should not expect much business in ———. The European competitor gives credit and thus gets most of the business. Of course he studies his customers through his traveling salesman and knows whom to trust and takes but few chances." Compliance with this custom is essential in all trade with South America.

70. *Methods of packing.*—There is a very general complaint abroad in regard to the method of packing by American firms who have as a rule shown contempt for this. The consul can be of invaluable aid in giving instructions to the merchant starting on foreign trade. If the merchant disregards these instructions, he has only himself to blame. American trade is often lost in

the Orient for this reason. To illustrate: An American firm was selling a bottled relish in the Philippines and sent it so badly packed that it often arrived in damaged condition. When the local firms wrote to the American house explaining that better packing would remedy the condition for further orders, the house replied curtly, saying that its men knew how to pack goods. Later shipments arrived in as badly damaged condition and as a consequence orders were transferred to a foreign house which guaranteed the condition of shipments.

It stands to reason that meats for hot climates must be very especially packed, furniture must be sent knocked down to avoid excessive freight charges, leather should be shipped in strong thick boxes, with zinc linings, bound with iron bands to keep out the dampness of a long sea voyage, and flour in barrels should have plenty of hoops to keep out moisture and allow rolling. Freight is very roughly handled on the Chilean coast, and in the trade with Chile poor packing on the part of many American exporters has been and still is a great handicap to the advance of American trade in these regions.

The consular reports are full of instructions in regard to methods of selling in foreign countries. Often catalogues and circulars are sent out by American firms in a language which the local merchant does not understand. It has been repeatedly pointed out that catalogues even in the local language cannot take the place of branch houses and traveling agents who speak the language and understand the customs of the country. Some consulates have a complete directory of local business houses and will file all catalogues and price lists received from the American houses, especially when in

the native languages. They even encourage exhibitions of samples of American manufacture, but exporters have not generally availed themselves of these offers.

71. *Foreign trade opportunities.*—Of late the United States government has followed the German method of discriminating in favor of its own citizens by giving them various classes of trade intelligence. In the daily *Commerce Reports* there is maintained a department entitled "Foreign Trade Opportunities." Here notice is given of inquiries on file at the Bureau of Manufactures. Each inquiry has a file number to which applicants refer. Some of them give names and addresses, but many are entirely confidential in the interest of promoting the American export trade exclusively. Among the things asked for are the following: mining machinery; celluloid for the manufacture of combs; dry goods agencies; cedar boards and machines for making pencils; railway ties; machinery for making sickles, scythes, straw cutters, and wood work; supplies for constructing electric tramway lines; American coal; household and kitchen novelties; chewing gum; telegraph and telephone supplies; American mirrors, and steel rails. It will be seen that there is a great variety in the articles called for. It will be well to quote a few of these trade opportunities as found listed in the reports:

NO. 3246. AMERICAN MACHINERY AND FURNITURE.—A report has been received from an American consul in Latin America in which he states that a business man in the city in which he is located desires to place orders for the following articles: Dental and surgical instruments, butter-making machinery, incubators, office furniture, and bread-making machinery. American manufacturers interested in these lines are

invited to mail to him at once catalogues illustrating their articles, as well as price lists and terms of payment.

No. 3291. COTTON-SEED OIL.—A report has been received from an American consular office in a city of southern Europe in which he states that advices have been received at his office from a local business man who desires to be placed in communication with American exporters of cotton-seed oil with a view to importing the same.

72. *Protection of customs revenues.*—There is another way in which the consuls help foreign trade. This is the protection of the customs revenue which, of course, deals only with the import trade. All goods intended to be imported into the United States must be accompanied by invoices sworn to and certified by the consul at the shipping port. The object is to help verify the correctness of the invoice and to prevent frauds upon the revenue. The system of ad valorem duties invites the undervaluation of imported goods. This gives an advantage to the foreign merchant. By means of consular effort to prevent this practice, dishonesty has been greatly checked.

If the American consular service is to become as efficient as it should, it must have a decidedly commercial trend, and display the qualities of good business management. An ideal consulate should not confine itself merely to attending to business, but should attempt to *create* new business. This it cannot do unless the important manufacturing and mercantile houses are willing to avail themselves of the consular services in spreading their trade in foreign countries.

CHAPTER VIII

ORGANIZATION IN MANUFACTURING INDUSTRIES

73. *Specialization and cooperation.*—In the previous chapters we have attempted to bring out the important lines of development in the industrial world which have influenced the organization of modern business. If we were to examine the business of transportation or of agriculture, the same tendencies toward mass production, i. e., transportation in bulk, and farming on a large scale, would be discovered. The machine has been as potent an influence here as in other fields. Combination of technical departments, consolidation of financial interests, coöperation among the working forces have been the means whereby the possibilities due to the separation of processes, to individual initiative, and to division of labor have been made to materialize. Specialized machinery, specialized management and specialized labor have made possible the present scale of production, but friction and retarded efficiency would have made these possibilities futile if cooperation had not been introduced. The establishment of an equilibrium between these two tendencies of specialization and cooperation is the problem of modern business organization.

Not only must there be a continual shifting, in order to maintain a balance of the great divisions of production, distribution and exchange, but the various units within each division must likewise change their positions so that their efficiency will not be reduced through

mal-adjustment; furthermore, each business concern must correlate the forces within its own organization if its product is to be made economically.

It is to this last point in the industrial organization that this chapter will direct attention. Whether the business enterprise is represented by the wholesale house, the department store, the small retail store, or the factory, the organization must adjust itself to the system of mass production. The organization of a manufacturing concern is chosen since certain problems pertaining to capital and labor arise here that do not become so prominent in the other enterprises.

It must become evident very soon to one investigating the essential principles underlying the organization of the manufacturing business that many forms of organization exist, and that any attempt to generalize must be confined to the few basic principles according to which the various forms are erected; and to a statement of tendencies prevailing in representative industries.

74. *Fundamental principles of factory organization.*—To maintain his profits under the prevailing conditions of competition and mass production, the manufacturer is compelled to extend his control over the market for the raw materials necessary for his product, and over the market which takes his wares. Both of these movements have increased his expenses and in neither case could he do it profitably unless the extension enabled him to produce more goods or permitted the same bulk to be handled by fewer men or more efficient methods. The thing aimed at in either case is the same—the reduction of cost per unit of output. This process of integration has had important effects upon the internal organization of the manufacturing establishment.

The key to the subject of factory organization is

specialization, standardization, duplication of standard parts, and system. These terms simply reflect the ideas embodied in the expressions—division of labor and so on, which are prevalent in the larger fields of industrial activity. It is the vocabulary from the point of view of the shop or factory rather than from the view point of the economist.

75. *Predetermining a business enterprise.*—Before taking up the application of these principles to the factory organization, there are certain features of the business that need attention. Capital, when once put into a manufacturing plant, becomes fixed. It cannot be withdrawn at will. It becomes necessary so far as possible to predetermine the success or failure of an enterprise; and by so doing offer protection to these large capital expenditures. The success of the business venture depends upon many conditions, but in general these will be covered by a consideration of the sources of raw material, of manufacture, of the sources of power, of the market from which labor must be drawn, the market for the product, the physical surroundings, the transportation facilities, and in some cases the reorganization of existing plants.

The necessity for establishing a business so that it will hold the correct relation to all of the above factors is pressing more and more upon every enterprise. The ideal combination can seldom or never be attained. It is these countless combinations which must be considered that stand as the greatest obstacle in the way of managerial monopoly. The largest of modern trusts is continually on the alert to discover the shifting of these relations so as to be prepared to meet the attack of some capitalist who is ever ready to take advantage of any weak spot in the existing organization.

76. *Source of raw materials.*—The location of the raw materials of industry has always been an important influence in deciding the building spot of a manufacturing plant. Especially has this been true in those industries where raw materials must be handled in large quantities. In the process of manufacture the bulk is reduced. Thus a great saving is made by using the raw material as near as possible to the source of its production. The advantage is in the difference in the cost of transporting the goods after their manufacture rather than before. The great flour mills have followed the wheat fields. There is a tendency for the steel mills to gravitate toward the iron mines. The cotton mills are seeking the cotton fields. Still this is not always a safe rule to follow. It is claimed by some authorities that the greatest flour milling company in the world went into the hands of a receiver because of the competition of mills established, not on the edge of the wheat producing belt, but in the midst of a region which was made barren of wheat when the great northwestern wheat fields and flour mills were opened up and established. The explanation is simply that the relations of the various factors in the organization of the flour milling business have changed. It pays, therefore, to build mills in London, Liverpool, Manchester, and in other market centers. The price of flour and the price of the by-products have both risen, and the cost of transportation has steadily declined.

77. *Source of power.*—This, like the location of the raw material, is a fundamental consideration; but it cannot be considered by itself alone. It is often a difficult question to decide whether to move to the source of the raw material supply, or to the coal field and water-fall. The location of the steel works in Pennsylvania seems

to be ideal from the point of view of the location of the raw material and the fuel supplies. The discovery of iron mines in the northwestern states somewhat changed the relationship of the factory to these two factors. With the development of the market in the western states, another element making for a disarrangement of the older relations was injected. The building of the great steel plant at Gary, Indiana, was probably a resultant of the effects of these various forces which have only recently become active. It has divided the distance between the raw materials and the fuel supply and has settled in the center of the greatest market of the near future.

78. *Labor market.*—Although this is one of the most important considerations in determining the location of a plant, yet it is a question which is more and more coming within the scope of business policy to solve. How far a business policy is effective in breaking down barriers of distance between the plant and the source of the labor supply is illustrated in the case of the coal mines and steel mills. Neither distance nor previous conditions of employment stand in the way, for it is a remarkable fact that these great industries depend upon agricultural laborers drawn from a labor market situated thousands of miles away in central and southern Europe. Still for the ordinary enterprise, the labor question is the most difficult to solve. The cotton mills of South Carolina have not yet solved it, but the business policies which are being put in operation are showing good results. Business methods pertaining to labor will be treated more specifically in the chapters on wage systems and industrial betterment in Part II.

79. *Market for the factory's output.*—Here again the factory is brought face to face with the transporta-

tion question. If the policy of the company is to control a small or local trade, there will be a great saving in expense if the middleman can be put aside and the selling done directly to the purchaser. This control and influence over the market is further desired because it enables him to put his goods upon the market when the demand is ripe.

80. *Transportation and its relation to factory location.*—This great commercial factor has re-distributed the trade centers of the world. The transportation has changed from the carrying of high-priced articles in small packages to the transporting of low priced commodities of great bulk. The character of a business should, therefore, be the determining factor in selecting a method of transportation. The relation of the railway to the market has such an important bearing upon the success of an enterprise that no pains should be spared in determining the question of rates of transportation before starting a business. A location, therefore, which has several competing railroads and waterways, has the most essential elements established for maintaining of low rates.

In deciding upon the location, transportation should be looked at from two points of view.

(1) The character of the business may demand water carriage, or it may require one or more railways. The lumber business is best served by water connections; the cement business by several lines of railway. Most businesses are best served when they have the heavy raw material and fuel brought to them by canal, and the manufactured product taken away by one or more lines of railway.

(2) The transportation of labor to and from the factory is the next consideration. Even in cities this is an

important factor. Laborers often live at great distances from the works. Sometimes a certain location is chosen because the land is cheap. Here there may be a railroad line which delivers freight once or twice a week, but no street car or other way of carrying the laborers nearer perhaps than within a mile or so of the works. One business which had proved a failure presented these transportation conditions exactly. It was found that the men had to get up at 5 o'clock in the morning to rush off and get a trolley which ran but once a day. At the end of the ride there was still a mile and a half to walk. It resulted in tiring the men before the day's work began. This particular case was complicated by the presence of a tavern which the men had to pass. Before the factory could be put upon its feet, a stage line had to be established between the trolley and the plant. This led a better class of workmen to the shops and resulted in improved workmanship, which justified a higher rate of wages. The point to be observed here is that the whole reorganization depended for its success upon the question of the transportation of the workmen.

81. *Physical surroundings.*—In treating of the physical surroundings and of the reorganization of the plant we are brought closer to the particular arrangements in and about the factory itself. If the broader relations of the location have been decided upon, there still remains the local environment, and it is at this point that the business relations in the restricted sense become the subject of our present study. The influences exerted by these factors will be seen directly in the productive efficiency of the plant. Many questions, such as the following, should be answered before a locality is chosen. Can a proper system of sanitation be installed? Is there good drinking water, and is the water free from

acid or alkali for service in boilers or whatever other service required of it in the manufacturing process? Are there proper sewage connections and drainage facilities? Is there plenty of room to care for waste products? Is the ground upon which the factory is put composed of quicksand, or is there a sub-stratum of clay which prevents the water from running away? These are only a few of the many things that may turn an otherwise favorable location into a very undesirable one. One has only to think of the many considerations that arise when a meat-packing concern is to be built, in order to see how varied and numerous are the problems under this score.

82. *Reorganization of existing plants.*—In the establishment of an organization there are three considerations in connection with the plant itself. (1) Is the building to be used for a new business? (2) Shall the new factory be built to accommodate an old business that is already established, but is to move to a new location, or (3) has the new factory to be made so as to take over a business that has outgrown its old facilities and opportunities?

In case it is a new business there is the advantage of being free from old precedents and policies and old situations; but on the other hand, there is the great problem of the uncertainty attendant upon an untried market for the product. Before a factory is built it is well to test the demand for a new product. Many new products find themselves supplanted very early by a competitive one. To lessen the risk incident to a new venture, factories have been established in different parts of the country which make it their business to take up a new mechanism and to make all the tools, drawings, molds and special machines that may be required

for turning out a new product. They will continue the manufacture until the product has been standardized and until there has been a fair test made of the public demand for the output; then the company will turn over all the tools, machines, etc., to the new company, which in all likelihood has erected its building in the meantime.

83. *Comparative advantages of the city and country.*—A manufacturer should not decide the question of location for a new plant until after he has investigated the various advantages of the city, the suburb, or some locality which has probably offered inducements in the nature of a bonus, or freedom from taxation for a period of years. The city offers advantages in the way of labor supply. To many employers this is the prime consideration. They desire to be independent of the laborers. If a man is discharged or leaves, the manager knows there will be a long list, or perhaps a line at the gate to select from the next morning. Then, too, the city with its large number of interests can be counted upon to act as a store house from which fuel or supplies can be drawn at a moment's notice. On the other hand, the laborers of the city are often strongly organized into unions, and wages are kept high by the competition for labor by many other firms. The factory which pays the best wages gets the best help. There are many examples of successful firms that have established themselves in great cities. The Baldwin Locomotive Works at Philadelphia is an illustration of this type.

The advantages of the small town or the country are in direct contrast to those of the city. Larger and more commodious works can be built; and "welfare" work can be adopted on a more extensive scale. The country, with its rural surroundings, offers many opportunities in these directions. Labor is generally cheaper, as

many people prefer the country to the city with its crowded and unhealthful tenements. But a strictly rural location means that the company must provide housing accommodations for its working people; and thus many administrative difficulties arise. The position of the factory surrounded by its own work people puts the management in a hard place when labor disputes arise. The discharged man has the sympathies of his neighbors. It is hard to evict a person, as such a course leads to scandal. The Pullman strike of 1894, under such conditions, led to a lowering of wages but not of rents, and the scandal did much to injure the enterprise.

As the population increases and the community grows older, the company will have to meet educational problems. Not only elementary schools but high schools will be demanded. Social and religious questions and disputes will affect the factory management; for the employés will not be of the same social ranks or beliefs; and last, but not least, political capital will continually be made of the company's position, and demagogues will never fail to decry it as a great oppressor, which "owns the men body and soul." Bickerings of this nature disgust many of the better men and they go to the city where the advantages of city life can be obtained, and with it, independence. In England, the best example of recent years of the tendency to desert the city for the rural conditions is that of the printing plants; but it is a well-known fact that when a printer who has a country workshop wants the best work done he sends to London.

Of course these considerations apply only in cases where a company has a choice of location and is not bound by circumstances to build in some specified place.

In England it is not a matter of choice, and as America becomes older, the freedom in this respect will become narrower. Frequently, in both England and the United States, the choice of location is restricted because the new works are the result of reorganization rather than new ventures. The old works may abandon the old site entirely and move to the country or suburb, but frequently old associations and habits of management overcome the considerations of economy offered by removal, and although they suffer from a manufacturing point of view, they seem successful in carrying out their policy. But this is generally a victory of mercantile management over the technical considerations.

These works are of two kinds. (1) There is the storied type where the work is carried on in an old building of three or more stories, which was not made for manufacturing purposes, but was turned into a factory through change of circumstances. Then, too, these old buildings may have been erected when manufacturing conditions were very different from those of the present time. (2) There is the scattered type, which owes its development to opportunities to build around a lot or yard or garden. When the limit was reached in this direction, new works were perhaps desired and the plant was extended by the use of property across the street for the purpose. Both types are more common in England than in the United States, yet they are by no means rare in the large older cities of America.

84. *Design of a modern plant.*—The modern plant is not built along the lines of the above type, which was often so scattered that one department might be in several buildings. To-day plants are built so they can expand and still retain the principle of unity embodied in

the small plant. The plan is to bring in the raw material and let it pass through the factory without doubling on itself during the successive processes of manufacture. The extent of the plant will be the result of many considerations, the size of the output, etc. The allotment of floor space will be made after a consideration of the kind and number of buildings to be erected upon a given space. In regard to the question of the subdivision of the floor space a compromise is often made in the case of engineering firms by adopting the alcove or side aisle arrangement, whereby the big things are located in the center, and on the sides the subsidiary processes are carried on instead of in separate buildings.

In the lay-out of the plant the proper balancing of the various departments is very essential. By this is meant that the machines in one department should not be so numerous as to produce more rapidly than the other departments can dispose of its product. It is only after a very careful analysis that the proper size of rooms and balancing of the different departments can be determined before hand. Yet it should be done in order to avoid a subsequent rearrangement of the whole interior. The older plan of making all the rooms in the factory of about the same size has proved disastrous so many times after the factory was started, that few men would think of following this method to-day.

An example of the old method is instanced in the case of a certain watch factory. The arrangement provided for the complete making of a watch of a certain size in one room, and of other sizes in another room. The operatives in each room became expert in turning out one particular style and size of watch. Failing to make this plan pay, the factory was put into the hands of a new manager. He rearranged the machinery

throughout the whole factory. All the machinery doing the same kind of work was put into one room. For example, all drilling machines were put into one place, all stamping machines into another, etc.

This brought about a new kind of specialization among the operatives. Instead of turning out a particular kind of watch, each operative became a specialist in one kind of process. It also brought about a new alignment of work. Where there had been one man in each room who did the stamping for the machines in that room, now all the stamping machines were grouped together and it was found that one man could attend to four machines. A little later it was discovered that a girl could do the same work as well as a man, and indeed it was not long before one girl was attending to six machines with less effort than was formerly made by the man with four machines. This was accomplished by putting a chair on wheels in front of a row of machines, so that the girl could be seated and still go from one machine to another by pushing the chair.

85. *Transmission of power. Tool room. Store rooms.*—If the factory uses electrical power it is considered the best arrangement to group the light machinery together and put the heavy machines by themselves. The latter should be placed on the ground floor, where the heavy product can be brought in. The lighter machines can be put on the upper floors.

The plan of the factory should provide for a tool room. Tools should not be left lying around to be lost or stolen. This room ought to be placed so that tools can be easily supplied to the operative without loss of time. It should not be necessary for him to leave his machine, but by pressing a button a boy from the tool-room can be summoned with the required tool. Me-

chanics do not as a rule supply their own tools. This is done by the factory which keeps a carefully indexed record of every tool, each man being charged with it until he returns the tool to its proper place.

Storerooms should be arranged for in the preliminary plans. Three classes of storerooms are desirable, each to care for the product in its three principal stages of manufacture—the raw material, the finished wares and the partially completed goods. Rooms for housing the partially completed goods may be called departmental store rooms. Their chief function is to provide a place for the inspection of the semi-finished product of each department before it goes on to the next. A system of inspection of this kind provides for the inspecting of the goods before they are fully completed and ready for the shipping room. The work of each man is thus inspected as it passes from one to another, and when some piece of work is found to be defective, the operations upon it can be stopped until it is remedied; or if the defect is a fatal one it can be cast out altogether. This is an important consideration, for if the inspection were delayed until the article was finished, all the operations after the defect occurred would be a pure loss.

86. *Standard equipment.*—While the subject of tools and their arrangement is under consideration, it may be well to mention another essential that should be provided for in the lay-out of a plant. Frequently there will be found in a machine shop a number of similar machines which differ from each other only in non-essential parts, as they are products of different factories. Provided these machines all do the same work there is a saving in expense if they are all alike. For example, lathes are nearly a standard product, but every manufacturer has his own ideas about the size

and style of screws, or the size of the countershaft, etc. A shop which has a half dozen lathes from as many different firms must keep in stock one or two extra parts to provide against breakage for each lathe. By having standard machines of the same make in use, the cost for carrying repair parts will be lessened and often much time saved through avoiding shut-downs.

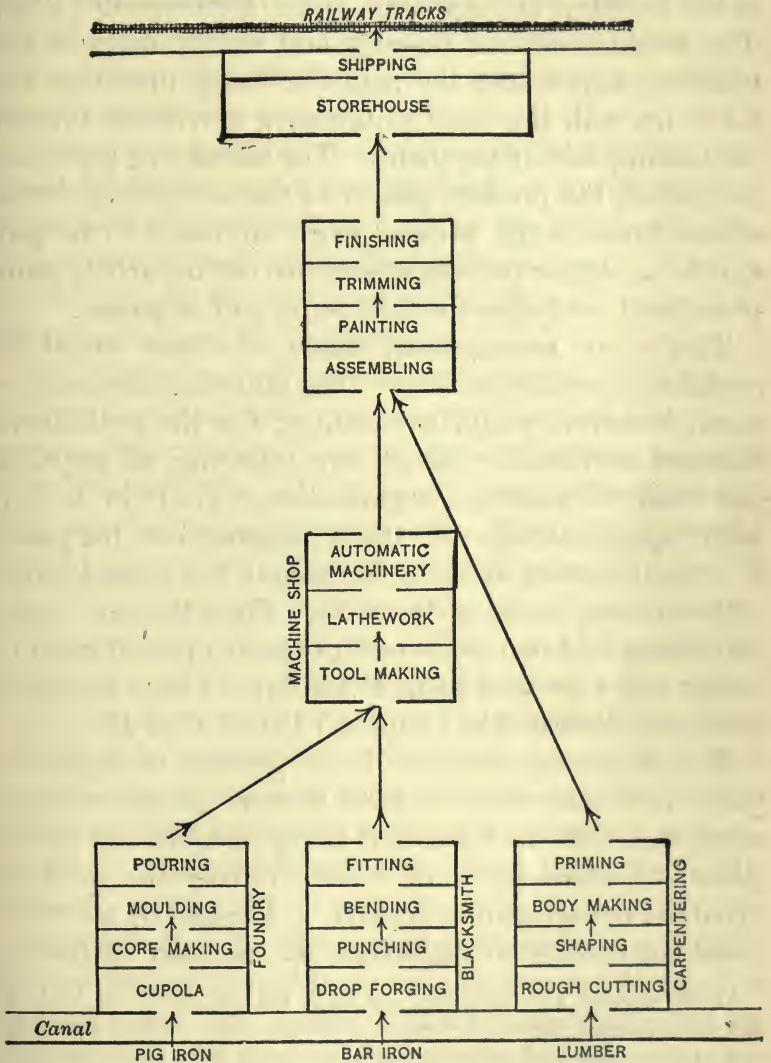
It might be added also that the substantial tool is the most economical in the long run. The light and cheap tool will produce inaccurate work and thus destroy the very purpose for which the product is designed. The appointment of an expert purchasing agent before the factory is fitted out, is almost as essential as planning the design of the floor space and transportation. He will know the difference between a cheap machine costing a small sum and a cheap machine in another sense, which, while costing a little larger sum at the beginning, will more than make up for the extra cost by producing better goods and lasting longer in the service.

87. *Transportation within the plant.*—As the original location of the plant is largely a question of economical transportation, so the location of the machines within the plant is largely determined by transportation requirements. The work should progress in one direction continuously and with as little handling as possible.

Transportation facilities at the plant may be divided into external and internal. The buildings should be so arranged as to facilitate the bringing in and taking away of the goods, while the internal lay-out should be such as to keep the goods moving in one direction in harmony with the outside transportation arrangement.

The following chart will illustrate the arrangement of buildings for carrying out the scheme of continuous movement in the same direction, and the logical ar-

rangement of the departments in order that the manufacturing process may harmonize with the scheme of



transportation in converging upon the shipping and loading side of the works.

As the raw materials arrive by way of the canal or

other water conveyance they are taken into the store houses. Then they pass through the various processes in the foundry, in the smithy, and in the carpenter shop. The products of the foundry and smithy meet in the machine shop where the manufacturing processes are taken up with the same progressive movement toward the loading side of the plant. The machining processes completed, the product passes to the assembling room, where it meets the wooden parts all ready to be put together. Other processes here turn out the article completed and ready for the storehouse and shipment.

This is one arrangement which of course would be modified to meet conditions. The same logical arrangement, however, would not change, for the continuous forward movement without any retracing of steps, is the basis of scientific organization. Even in a city where space is scarce and the arrangement of the plant is vertical instead of being horizontal, the logical order of processing would be the same. Here the raw material comes in down stairs and proceeds upward until it comes out a finished good at the top. Other arrangements are discussed in Chapter VIII of Part II.

For the transportation of the product through the plant it is customary to have narrow gauge railways connected with the track that brings the product to the plant. Various kinds of trucks convey the product from one department to another.¹ Frequently there are overhead trolleys which obviate the necessity of having

¹ Both switches and turntables are used, but the latter are liable to get out of order. They are cheaper, however. Some experts advise the use of large wheels, claiming that the trucks run more easily. In many cases the overhead trolley with the pneumatic hoist is a very profitable combination, especially if heavy materials are to be loaded or unloaded. Such an arrangement can be operated either by hand, compressed air or electricity. The system of transportation also provides for carrying away the waste product from every machine. This waste is carefully weighed and

a man to load and unload the truck. When a truck comes to a man at a machine he takes out his material, and when his work upon it is completed another truck comes alongside and carries the product to the next man. This system saves much time and work in the handling of the material.

The transportation of small products is often provided for by the use of traveling belts. As the product passes along it can be taken off by the men at the machines; as each man completes his work upon it, the belt carries it on to the next. This is a favorite method in the manufacture of food products.

88. *Conveyance of internal information.*—Transportation is not confined to the conveying of materials alone. The question of carrying intelligence is one that must be solved also. There is no time which the average business man begrudges more than that lost in getting information or conveying it to his subordinates and others. The messenger service is the commonest form in large concerns, although many firms use all the familiar means, such as the telephone and whistling tubes. One unique method to call the superintendent or some other official, is to blow the whistle, which can be heard all over a large plant, and by a schedule of signals—one whistle for the manager, two for the foreman, and so on—much time can be saved in calling these men when urgently wanted.

In some factories the messenger service provides for the sending of a boy from one department to another every hour or half hour. He takes messages and inquiries from one foreman to another on one trip, and brings back the answers on his return. This makes it

a record kept of it. In this way the efficiency of the man is determined, for it can be found out whether he is wasting the product or not.

unnecessary for the foreman to leave his department in search of information.

89. *Summary.*—In summarizing the points included in the preliminary determination of the location and design of the plant, it will be seen that the first problem to attack is the determination of the nature of the product to be manufactured, and to classify the various raw materials that are to be used. When this has been decided upon, and when it is known how the processes necessary in manufacturing the article follow each other in their natural sequence, the various departments may be planned and the floor space assigned to each department. Finally, after it has been settled how the space is to be equipped with machinery for the manufacturing processes and the transportation systems, the walls of the building may be erected.

The basis for the organization has now been established. There remains the classification of the various activities as they are related to the fundamental principles. The first function that naturally differentiates itself is that of administration: the second, that of manufacture; and the third, the commercial activities connected with the production and the disposal of the product. The various systems of accounting and of gathering information will naturally be influenced by a consideration of these fundamental divisions.

The following outline will show the various preliminaries in the procedure of preparing to manufacture a certain product:

1. The plans. These include the exact determining of whatever is necessary for efficient service in the productive operations, and their most effective arrangement.

2. The provision of the various things necessary in the production of the product.
 - a. Buildings which are adapted to the desired operations or the manufacture of certain goods.
 - b. Appropriate machinery for this manufacture.
 - c. A power plant to drive the machinery and to heat and light the factory.
 - d. Machines and tools which are needed in the mechanical operations or by the workmen.
 - e. Other apparatus and any other appliances besides machinery and tools.
 - f. Patterns or designs or models to be used as guides in the manufacture of the goods.
3. The operation of the power plant and the machinery.

CHAPTER IX

DEPARTMENTAL FUNCTIONS AND ORGANIZATION

90. *Basis of departmental divisions.*—The previous chapter dealt with the various factors to be considered in laying out a plant. It is presumed that the incorporating of the business under state laws, the financing of the enterprise and the duties of officers pertaining thereto have also been properly attended to. It is now necessary to determine upon what basis the electing and appointing of the various authorities shall be established so that the duties of each will correlate and work in harmony with the others. If friction between the heads of departments is to be reduced to a minimum, it must be done by a scientific division of authorities based on business functions. Cooperation is thus induced naturally.

The question of selecting the men for the positions of authority resolves itself to a discrimination between them according to their natural or trained abilities to direct the activities pertaining to a particular business function. In order to make the proper division of a manufacturing business into departments, a chart displaying the geographical arrangement such as the one shown in the last chapter is often used. Another kind of chart is sometimes used by systematizers to display the various primary functions of the business, and to show their connections. For an example of a chart of this kind and a further discussion of departmental relations the reader may turn to Chapter II of Part II.

91. *Prime functions of a manufacturing business.*—

The prime functions of a manufacturing business are discussed under the following twelve heads:

1. CONTROLLING THE SUPPLY OF STOCK USED IN MANUFACTURING. (RAW MATERIAL.) This function is divided into

- (a) A general central control (main office).
- (b) Territorial control (branch or divisional offices).
- (c) Local control (sub-companies).

The order of authority is from the main office down. The sub-companies are organized individually to secure stock by mining, lumbering, local buying or other means and then to ship the same to the factory.

2. PURCHASING OPERATING MATERIALS AND SUPPLIES.

(a) Buying.

- (1) Contracting.
- (2) Direct purchasing.

(b) Ordering.

- (1) Receiving requisitions.
- (2) Approving requisitions.
- (3) Placing orders to fill requisitions.

(c) Approval of invoices.

The department is controlled by a manager or general purchasing agent, who is assisted by special buyers. These have charge of certain classes of material. The buying is done in some cases by making time and approximate quantity contracts—often by a purchasing committee—with the sellers. Most of the small purchases which are in great variety are made directly after securing competitive prices with the individual. The receiving of requisitions includes the filing of them and the acknowledgment of their receipt. The approving of requisitions involves the checking of the same, if made to replenish stores, against present inventory, past

purchases and consumption, and probable future needs. But if it is made to obtain material of a special nature, or for a special job or order for goods, then the checking is against the works order or against the need as stated by the proper foreman. The object of this is to prove the business necessity of the filing of the said requisition; it also reduces the inventory of materials at the works.

The placing of orders to fill approved requisitions is, for materials under contract, a matter of routine, but for individual and special material not under a supplier's contract it is a matter for the manager or one of his assistants.

3. TESTING. - The functions of testing are to establish standards according to which formal specifications or requirements are set and must be met by suppliers or workers. The testing department examines and compares the quality of materials received at the factory and the quality of the products of the factory, with approved standards. This function often extends to making trials or tests of equipment, such as machinery, boilers, engines, apparatus, formulæ or methods of manufacture. As a result new and improved processes of manufacture, or new or better machinery and tools are developed. The department of testing makes special or periodical reports to the manufacturing, purchasing or other departments which embody the results of its trials or tests, and advises upon the acceptance or rejection or the grading of materials and products.

4. EMPLOYING. This function embraces the supervision in general of all matters pertaining to employes of the factory other than the direction of their productive activities. These matters embrace:

(a) **Hiring.** This is done by an employment bureau

which receives and files applications for work, and engages laborers of the best ability and character obtainable for the foremen.

(b) Recording. The bureau records the main facts pertaining to each employé as a person and a worker. Data are taken regarding name, age, experience, references, occupations, rates of pay, dates of starting and leaving, social and physical characteristics, and conduct and efficiency as an employé.

(c) Instructing. This pertains to the duties that the worker is to perform in order that he may secure proficiency and efficiency as soon as possible, and that losses through accidents and waste of material may be reduced to a minimum. The bureau sometimes supervises the instruction but most commonly the foremen or functional bosses assume the responsibility.

(d) Rating. Wages are fixed by the bureau or under their supervision on the basis of the specific occupation, by specific agreement between employé and foreman or in accordance with whatever special system of wages the factory may have adopted, such as piece work or premium systems.

5. SELLING. The function of selling embraces the securing of orders, estimating, ordering and advertising.

(a) Selling—i. e., securing of orders from customers for production and shipment to them at specified times of certain goods at agreed prices under stated terms.¹

(b) Estimating—i. e., valuing by calculation and expert appraisal the cost of producing specific articles desired by customers. This function comprehends the

¹The reader's attention is especially directed to the chapter on sales in the volume on COMMERCIAL LAW, where the legal requirement of the statute of fraud with regard to the sales exceeding the amount of \$50 is treated.

fixing of a price at which the goods can be sold at a profit.

(c) Ordering—i. e., sending a formal statement to the manufacturing department of the customer's accepted request for goods, and the following of it to see that the order is filled.

The procedure is as follows:

- (1) Receiving from customers the requests or orders in various forms.
- (2) Transforming and copying same to and on a standard form.
- (3) Filing copies.
- (4) Forwarding the orders to the manufacturer's department.

The various forms of orders are:

- (1) Contracts covering a period of time or a certain quantity.
- (2) Requisitions on contract which may be periodical or irregular.
- (3) Transient or individual orders filled generally at one time.

(d) Advertising. The giving of information to customers, the trade and the public, regarding the products of the company, in order to secure orders.

The selling department is managed by a manager of sales, aided by assistant managers, each of whom is in charge of a certain class of goods and is at the head of a specialized division of sales. The operations are conducted through the main office. The branch offices are managed by sales agents. These agents have control, subject to the direction of both the manager and the assistant managers, of the company's business with the customers within a certain territory.

6. **WAREHOUSING.** This function includes the storing of goods.

(a) The storing of parts or partially finished articles as they are received from the foremen of certain departments but which will be required later on in other departments.

(b) The storing of finished goods which are delivered to the warehouse for immediate or subsequent shipment to customers.

A system of checking and inspection may accompany the function of warehousing. The partly finished goods are checked against production orders and normal requirements and they are accounted for in a similar manner to stores. The system of inspection may follow the goods into the intermediate store rooms.

The finished goods are located, inspected, checked against orders, packed and shipped in accordance with shipping orders and routing instructions. There are many devices whereby proper stocks consistent with the requirements of the sales department are maintained.

7. **TRANSPORTING.** This function pertains to the directing and the forwarding of goods.

(a) The department provides:

(1) Cars or boats.

(2) Unloading, transferring or storing facilities and equipment, including the necessary help.

(3) Trucks and wagons for delivery of goods.

(4) Routing instructions to shipping clerks and railroad agents.

(5) The department is responsible for the safe and prompt delivery of goods at the proper destination.

(6) In case of unsatisfactory service it makes

complaints and pushes the claims against the carrier.

- (7) It endeavors to secure the best terms practicable for special service, and at all times to give the company the benefit of the lowest transportation rates in forwarding goods.
- (8) The department approves all bills from transportation companies.
- (9) In general the department controls all dealings between the company and all transportation, lighterage, steamship, storage and trucking companies which handle the output of the company, or which ship the raw and operating materials to the works.

8. MAINTENANCE. This covers the upkeep of the property including repairs and renewals, both ordinary and extraordinary.

- (a) Buildings and grounds.
- (b) Machinery, tools and apparatus.
- (c) Boilers, engines and power generators of any kind.

9. IMPROVEMENT. This department controls the replacing of existing buildings or equipment with improved types and greater relative efficiency. This work is done in connection with the two departments of maintenance and of manufacture. The latter may request an equipment which will enable them to reduce the cost of production so as to meet competition, or increase profits. The work is similar to maintenance and yet it is of such a nature that it cannot be chargeable directly, at least, at the time, to the expense of operating the factory. The doing of this work is a matter of policy, based on a judgment as to the relative profit before and after the change. Such work is often limited by the

financial ability of the company to incur the expense or by the wishes of the stockholders for dividends instead of an improved plant.

10. CONSTRUCTION.—This covers the work of providing the factory with buildings and equipment to start with and then of providing properly constructed, arranged and equipped buildings of various kinds as the business grows. This department may be complete as a creative agency, or may only go as far as the planning of the work to be done. The functions of maintenance, improvement and construction are often performed by one department, sometimes with and sometimes without specialized divisions.

11. EXECUTIVE. The function of financing and planning the enterprise is given to the executive department.

- (a) The directors, elected by stockholders.
- (b) The executive committee.
- (c) The finance committee.
- (d) The president.
- (e) First vice president or general manager.
- (f) Experts.

12. ADMINISTRATIVE DEPARTMENTS.

- (a) Secretary.
- (b) Treasury.
- (c) Auditing.
- (d) Accounting.
- (e) Cost.
- (f) Statistical.
- (g) Real Estate.
- (h) Legal.

The various types of organization and management, found in the factories of the same and of different industries are the several combinations of these depart-

ments and divisions. The general plans according to which various manufacturing operations are carried on vary considerably. To such an extent is this true that no generalization or grouping is practicable except to a limited extent.

The following list of activities together with two columns containing descriptive phrases embody the principal characteristics embraced in any scheme of organization. It will be readily seen that any number of combinations may be made. For example, the control may be exercised by the owners, but under a system of management which depends upon the local branch offices for direct supervision. All kinds of production may be combined with either the military or functional systems of direction, etc., etc.

<i>Activity.</i>	<i>Plan A.</i>	<i>Plan B.</i>
1. Control	By owners	By salaried employés
2. Management	Local	From main office
3. Superintendence	Personal	Impersonal
4. Output	Simple	Complex
5. Production	Similar	Varied
6. Processes	Specialized	Standardized
7. Business	Competitive	Monopoly
8. Direction	Military	Functional
9. Instruction	Formal (in writing)	Informal (verbal)
10. Employés	Organized, i. e. (Labor Unions)	Unorganized
11. Wages	Piece or premium rates	Daily or hourly rates
12. Machinery	Hand	Automatic
13. Development	Progressive	Unprogressive
14. Evolution	Equal	Unequal
15. Growth	Systematic	Unsystematic
16. Methods	Effectual	Ineffectual
17. Results	Profit	Loss
18. Conditions	Past	Present
19. Forms	Actual	Ideal

92. *Duties of the officers.*—The first transaction of a business nature, as we have seen, is the selection of the

general officers of the company. The second is, logically, the choice of the heads of the three divisions, the executive, the selling and the manufacturing. The next step involves the selection of sub-heads for each division and the departments within each division. If the planning of the organization has been done on scientific lines these officers will settle into places, the principal relations of which are already established by natural conditions.

However, in cases where the activities of one department come in contact with several other departments, the practical problem of drawing a line that will define the boundary within which each authority shall be operative is a very difficult one. It is easy to see that the making of a bolt or casting relates solely to the machinery department, but the keeping of the factory accounts is not so easily allocated for it will reach into the selling, the financial and executive divisions.

In assigning duties to the various officers, it is not presumed that the following classifications are anything more than typical cases.

The president is usually the general supervising officer of the company. He presides at all meetings of the stockholders and at all board meetings; he signs all stock certificates and sometimes all other papers. He may, however, be chosen merely for the influence of his name, in which case he is only a figure-head, and a managing director is appointed to do the work. This figure-head type is rarer in the United States than in Europe.

The vice-president simply assumes the duties of the president when the latter is absent, unless as in the case of the railway company, he takes an active participation in the business.

The treasurer has custody of all the company funds and securities; he has charge of the books, and he oversees the vouchers and makes up the financial reports. In case there is an auditor, he is usually under the treasurer, and he will have charge of the company's books and will check up all accounts. There may also be a comptroller who is the author of and is responsible for questions pertaining to general accounting, cost accounting, systematization and so on. His relation to the board of directors, the executive committee and the president is the same as that of the general manager in value and expression. He becomes the chief authority in all questions relating to organization.

The secretary keeps the minutes of the company; he has charge of the company's seal, of the stock certificate book and other books; he looks to the issuing, transferance and cancellation of the company's stock, and makes regular reports.

The president, vice-president, secretary and treasurer are directly engaged in the corporate works of the company, except in the case of the treasurer when he becomes closely associated with the business end of the factory and has other duties than those connected with the corporate finances.

The general manager is in charge of the active business of selling and production. Under him are the heads of the selling and manufacturing divisions, namely, the sales manager and the factory superintendent.

From our point of view the general manager is the chief authority in the organization. He is "the main spring of the active business end of the company." He must possess certain qualities, such as a strong individuality, tact, resourcefulness, forcefulness, and at the same

time he must have a knowledge of the principals of organization and management. On him devolves the duty of selecting his subordinates, either personally, if he is in a small organization, or through a department if he is in a large one.

93. *Military method of organization.*—There are two distinct methods of directing the organization below the superintendent. One is the military form where the manager is practically the general of the army; he has under him, majors, captains and lieutenants who carry out his commands. Under this mode of directing, the staff must be trained to the manager's policy. The advantages and disadvantages of this type of organization from the manager's standpoint are discussed in Chapter III of Part II.

Much depends upon the foreman's capacity to grasp the larger problems of the manager's policy. In arranging for the work of the foreman, it has been determined of late that the same process shall be adopted in developing efficient specialists here as was done in the case of the common laborer. Each foreman instead of having charge of a number of men performing many kinds of work, has now one thing to do. This was found necessary because capable foremen of the broader type were difficult to find. Such general work demands of a foreman that he have a fair quota of brains, some general education, fair physical health, some technical knowledge and some manual dexterity. In common with all administrative positions, his position calls for tact and judgment. He must have a knowledge of every part of the product; he must see that the workmen use their time for the best interests of the company. He must be a "hustler" himself and he must know how fast other men can work. His duties embrace the dis-

ciplining of the man, the settling of disputes between employés and the adjusting of wages in case of absence, sickness and so on.

94. *Functional method of organization.*—The difficulty of getting men of the proper caliber to take charge of the departments has set managers to devising a method or organization which calls for less ability in any one foreman. Accordingly the functional method of organization is gradually supplanting the military method. In an organization of this kind, a man possessing three or four of the above named qualifications can be trained to fill the position of a functional foreman. He is required to do only two or three things, and in the larger shops only one thing. This does not mean that the same amount of ability, taking the shop as a whole, is not needed under the functional plan, but that it is organized differently. All the ability which is needed for planning is concentrated in a planning department. The shop foremen are no longer expected to do this. In a fairly large factory there will be four foremen in the planning department, and another set of four foremen will be constantly upon the floor of the shop instructing and helping the men. This division of labor causes no confusion, for the workmen never see the foremen in the planning department. This illustrates how all the functions may be separated, and whereas the old system provided one foreman from whom a group of men took their orders, the newer method permits any workman to have as many as eight bosses.

Although the planning department is fully treated under the head of "Management," it is necessary to give here a brief review of its operations. In the first place the men in this department are of a higher caliber than the trained laborers who are foremen in the shop. The

room itself is planned to provide for a series of panels and pigeon holes. Each section of a panel with its hook and each pigeon hole represents a particular tool. As the records of work come into the planning department from the departments of the shop they are divided up and put into the different pigeon holes. They are then ready to be given to another department for another operation. One man is in charge of this work and his duty is to see that the incoming records are properly distributed and that the work upon the machines is kept going properly, for as a man finishes a job the planning department sees that he is supplied with another. This man in the planning room becomes very expert in filling up pigeon holes and seeing that there is work in them all the time. If the work is not going in and out, from one machine to another, as fast as planned, the speed boss, of whom we will speak later, is called and asked to explain the cause of the delay. On the other hand, if any of the pigeon holes become congested it means that some machines are working too fast or others are working too slowly and this calls for an investigation.

95. *Foremen of the planning department and their duties.*—The foremen in this department are the (1) route clerk, (2) the instruction card man, (3) the cost clerk, (4) the time clerk.

The route clerk plans the course which each piece of work is to travel on its way through the shop from one machine to another. He informs the superintendent of the various workmen, by means of written cards exactly what each workman may expect to appear at his machine at any particular hour during the day. Thus are the various shop bosses kept in touch with the chronological order of procedure and they know what must be

done if the work is to be produced in proper routine.

The instruction card man draws up another set of cards showing the number of the pieces of work which the route clerk had directed on its course from machine to machine. He supplies the cost order number on the card and puts instructions on it pertaining to the various tools and fixtures that are to be used on each piece of work in carrying out every process.

This card also gives instructions to the foremen as to what tools and fixtures it is necessary to supply the men with, and hence there is no necessity for the workman to leave his machine for any purpose during working hours. The tools are brought to him and the raw materials are delivered at his machine. By looking at his instruction card he knows just how to set his machine for the proper speed and proper feed. The thinking is done in the planning room and the functional foremen in the shop simply obey instructions.

The cost and time clerks formulate instructions for recording the time which each man is expected to consume in his work. For example: the cost clerk lays out in advance the length of time which each workman is expected to take in doing his piece of work. If, for some reason, the workman is unable to do his task in the time allotted to him, it becomes his duty to inform the shop foreman that a mistake has been made in calculating the time. The speed boss then takes up the matter, and if after examining the machine to see that no mistake has been made in its setting, he finds the workman's statement correct, he reports the case to the planning department for correction.

96. *Shop bosses and their duties.*—In the shop there are (1) the gang boss, (2) the speed boss, (3) the inspector, (4) the disciplinarian. These men can be se-

lected without difficulty and their training provided for if the manager has a clear idea of what he wants to accomplish.

The gang boss has no definite duties as such. He simply carries out such work as the planning department assigns him.

The speed boss sees that the work is carried out according to the schedule sent out by the planning room.

The inspector looks after the quality of the work as it comes from the machines. He must be able to instruct the men as to the type and quality of workmanship required.

The disciplinarian settles all cases of insubordination, and passes judgment upon the disputes which arise between workmen and foremen.

There is a fifth boss in some factories whose duty it is to keep the machines clean and in repair; and in addition he may be called upon to keep things in good order.

Functional organization is being strongly urged by some of the best accountants and industrial engineers in the country. Mr. H. F. J. Porter, one of the leading authorities upon industrial organization, in a paper upholding the above method, quotes the following instance showing the results of this method:

In connection with a large foundry, we had men loading pig iron on cars by carrying it up an inclined plane. It had been customary to pay the men \$1.15 a day for carrying 12 to 13 tons of pig iron.

The lowest grade of labor had been doing this work. If a man applied for work, he was put into one of these gangs. The better men, as they proved themselves, were later taken out and put into the shop as machinists, etc. That left in these gangs only the young, untrained men, who were not particularly

strong, or the old men who were incapacitated for any other work.

The functional foremanship plan was introduced into these gangs and the laborers were taught how to handle the pig iron. A careful study was made covering a period of several weeks to determine just how fast the men ought to be able to handle the iron, pick it up, carry it a certain distance, get to the car, drop it, and come back again.

The work was divided into several processes and the men were encouraged by the prospect of increased pay provided the output was larger. A good many of the men resisted. They could not be speeded up. These were weeded out and others put in their places. They were urged not to overwork, but simply to do a fair day's work.

The result of all this was that instead of a man getting \$1.15 a day for carrying 12 to 13 tons, he averaged in a short time \$1.85 a day for loading from 45 to 48 tons—but these were an entirely different set of men from the ones we had started with.

CHAPTER X

INTERDEPARTMENTAL RELATIONS

97. *Course of an order for goods.*—Let us now consider the system by which the orders secured by the sales department from customers are converted into finished goods and how they are sent back to the purchaser. We shall assume that the sales department is located at the main office with a sales manager in charge and a corps of clerks as assistants. Under the manager come the district sales offices, each having a certain territory within which are located the traveling salesmen, the local stores or other means by which the company's product is disposed of.

Let us assume that the main office is located in Philadelphia and the district sales offices in various cities; one in Boston to take care of the New England states; one in Albany covering the territory of New York and perhaps that of northern Pennsylvania; another in Cleveland to care for the Ohio, West Virginia and Western Pennsylvania territory.

The district managers have under them the "drummers," who are either located at some important centers, or travel over the territory at regular intervals. Each branch office may keep on hand a small stock of goods to be used as samples, or may run a store of considerable size. This branch system is also used in the instruction of salesmen, which is treated of under "Salesmanship" in a succeeding chapter.

We are now interested in the course which an order

takes through the factory and how it reaches the purchaser by whom it was given. We will suppose that the salesman has overcome all difficulties and secured his order. Various forms are used in sending the order to the factory, depending upon the character of the goods. The following will serve as a sample:

Date.....			
The A. B. Company,			
Philadelphia, Pa.			
Gentlemen:			
Please furnish to the Purchaser Company at 100 Blank Street, Chicago, the following:			
Quantity.	Quality.	No.	Further Details.
Method of Shipment.....		Mail.....	Express.....
Terms.....		when shipment must be made.	

The orders received every day in the order department of the branch house are sorted. A careful record is made showing the number of sales, the various kinds of products and the different sales managers under whom the goods were sold. If the branch has the product in stock it will fill the order directly; if not, the order goes to the home office, where orders are grouped and the factory notified as to what should be manufactured.

When the order is received by the order department, it will be sent immediately to the shipping department, a duplicate going to the stores department. This duplicate serves as authority for the delivery of the finished goods by the stores department to the shipping department. When the goods are turned over for shipment

an inspector sees that the packing is done properly and that the final shipment is made in accordance with the order department's instructions.

In case the required goods are not in store but must be manufactured, the direction of the order takes another course. A copy is sent first to the superintendent of the production division. If the order calls for standard products he decides upon the number of parts that must be made, and notifies the different departments concerned in their production.

If, however, the order is for a new style or new product, the engineering department is consulted by the sales manager. A design is made and a factory order number is assigned to it, which number is retained until the finished article appears in the store room.

As an illustration let us take an ordinary steam valve. The parts of this article are one wooden handle, two brass discs, one cast iron body, two screws. The superintendent will order these different parts from the store room to the assembling room. The washers will be ordered from the press-room, the steel stems from the machine shop, the wheels for the valves from the carpenter shop, the brass discs from the brass foundry and the iron body from the iron foundry. If the screws are not in stock the purchasing department will be ordered to buy them. The order will go through the shop bearing the order number which has been given it. Each department will turn out its part of it and send it to the stores department. Perhaps there may be departmental store rooms; if so, then the inspector examines it at that stage of manufacture before the workmen get their pay. The stores department then turns the parts over to the assembling department. Having been put into its final form, the valve is returned to the stores department

for finished goods, and after a final inspection is ready for the shipping department, the district sales manager and the customer for whom it is made.

The forms that are used for carrying the work through the various processes which have been referred to are generally stock forms. They may vary in details in different businesses, but in general outline they are very simple.

Thus instead of sending an order through the factory calling for 200 valves, the order goes through calling for these six different parts—namely, 200 washers, 200 wheels, 200 stems, 400 screws, 200 cast iron bodies, 400 brass discs.

98. *Drafting department.*—Reference was made to the close connection between the engineering and sales departments. There also exists a vital relation between the engineering department and the shop itself. The character of the design is important, since all the processes necessary to produce the product will be shaped by it. Hence a design should not be decided upon until a thorough investigation has been made regarding its fitness for the market and the factory conditions governing its manufacture. Among the latter factors to be considered are the ease and cheapness of manufacture, the use of standard and stock parts, and the working relations between the several departmental authorities. One of the great drawbacks to economy, efficiency and progressiveness in many organizations, is the hostility that exists between the various departments. This hostility can be broken down to a large extent by having the draftsmen mingle constantly with the shop foremen, not only to establish a personal touch between the two departments, but that the draftsman may absorb all the shop and foundry practice possible. Designs that prove a

practical success soon gain the respect of the mechanic. Nothing gives a manager more assurance than to feel that every design represents the combined knowledge of the two departments. The shop men, from their shop experience and knowledge of past mistakes, can offer much that is beneficial. Such conferences will also facilitate better routing of the work through the shop. There may be a still further development due to this inter-departmental intercourse, namely, a thorough and profitable consideration of the re-design of the regular product. Goods of special sizes and quality can often be changed to a standardized product. Here again the sales department must aid the engineering end of the business by attempting to change public taste so that a standard article will be accepted in place of the individualized sort. Again, if the draftsmen are in close touch with the factory, they will be readily impressed with the necessity of designing parts that can be easily and cheaply machined and assembled, taking into consideration the types of machine tools that must be employed.

The confidence and cooperation of the shopmen can be further gained by having a rule that all drawings must be O. K.'d by the shop foremen before they are placed in the shop. The sustained interest of the foremen may be maintained by a system of reports which they must make based upon their actual experience while the product is passing through their hands. These reports may contain criticisms of the design or new suggestions.

In order to give regularity and vitality to such intercourse between the departments, some system of consultation should be devised. One eminently practical and successful manager appointed a committee consist-

ing of the head designer or draftsman, the head of the tool room, the factory manager, the important machine-room foremen and the head cost man. At times this committee was aided by the presence of the foundry man, the pattern maker and the stock man. Before this committee came all ideas pertaining to the new design or re-design of an old product. "The experienced shop manager," says Mr. Charles U. Carpenter, "has only to consider the usual maddening program of errors in data, mistakes in design, faulty judgment regarding economy of manufacture, lack of standardization of parts, and last, but by no means least, the covert hostility of the shopmen to the new productions of 'that drafting department,' to realize the possibilities which lie in developing methods which will insure accuracy, economy, standardization, and the interest of the machine foreman in the successful and economical production of any particular design." Standardization of design, as an important element in management, is treated in Chapter VI of Part II.

99. *Tool room.*—The relation of this department to the remainder of the factory is most vital. The tool room has been termed "the heart of the shop." No factory, any more than the artisan, can do its best work with poor tools. The tool room is therefore responsible for the determination of what the maximum efficiency of a factory is. Not until the tool room is in a relatively perfect condition can there be established a basis for the determination of all these individual standards by which the efficiency of the various producing factors can be measured. The possible output, the lowest cost of production, a wage standard—all depend on the accurate determination of the lowest possible time in which each piece of work can be done. Upon the tool room falls the burden of starting the productive forces,

labor and machines, at a rate consistent with the above requirements.

To begin with, then, the tool room must meet certain tests. Has it a knowledge of the best results that can be obtained from the high-speed cutting tool steel? Does it know the proper shape and size of the cutting tool? Has it a knowledge of the character of the steel worked upon? Has it determined the greatest capacity of the machine tool used with reference to maintenance expense and depreciation?

The tool room is in reality a factory within a factory. It is a place for making tools that are to be used in the building of the finished machine for the market. All the methods, therefore, that apply to the organization of the factory proper will apply to the production of tools. Standardization, duplication, subdivision of labor—all apply here in principle as well as in the main organization.

100. *Local management versus direction from a distance.*—The relations which have been considered so far in this chapter have pertained chiefly to departmental functions. The method of management as a system of control has only been referred to indirectly by the mention of branch offices, etc. The changes which are going on in the method of management are in harmony with the general tendency to concentrate the control of industrial enterprises in the hands of a few. Local management has disappeared in many large companies; that is, the functions of management are largely performed at a main office, more or less distant from the factory, the latter being left in charge of a resident superintendent, who carries out the instructions of the main office and uses such equipment and materials as are given to him.

Local management exists where the different functions are performed by departments and divisions located at the factory. This condition of affairs is said to exist until the balance of power has been absorbed at a main office, which by the character of its orders show that the directing authority has been changed from a local to a centralized control. A main office may perform only a few of the functions or it may exercise all of them. The practice differs with the different companies. The advantages of this separation of the management from the factory lies in the fact that the business transactions are more readily carried on at a business center or a large city, and if the company owns more than one factory, centralization and specialization in management are to an extent productive of considerable administrative economy. Many of the functions can be as well performed away from the mill as at the mill. The telephone, the telegraph and the mail express have made this possible and easy. But, on the other hand, main office management tends to become formal and automatic. Indirect, impersonal and mechanical management has all the disadvantages incident to control on the basis of knowledge not obtained through the senses and by contact.

Some examples of separation may be seen in the movement to a main office of those functions which were associated originally solely with the factory. Briefly these functions are: the supply of equipment and raw material, the employment of labor, the manufacturing of goods, the storing, warehousing and shipping of same, and the maintenance of the plant. While it is not uncommon to find the executive and selling functions located at the factory, these will be the first to be moved when a separation is decided upon. The following illustrates this separation:

I. <i>Functions performed at the factory:</i>	<i>Functions performed at main office:</i>
Equipment.	Executive.
Supplying raw material.	Administrative.
Purchasing.	Selling.
Employment.	
Manufacturing.	
Stores and warehouse.	
Transportation.	
Maintenance.	
II. <i>Functions performed at factory:</i>	<i>Functions performed at main office:</i>
Purchasing.	Executive.
Employment.	Administrative.
Manufacturing.	Selling.
Store and warehouse.	Supplying raw material.
Maintenance.	Transportation.
	Equipment.
III. <i>Functions performed at factory:</i>	<i>Functions performed at main office:</i>
Employment.	Executive.
Manufacturing (part).	Administrative.
Stores and warehouse.	Selling.
Maintenance (part).	Supplying raw material.
	Purchasing.
	Manufacturing (part).
	Transportation.
	Maintenance (part).
	Equipment.

101. *Character of the controlling authority and its relation to the business.*—The control by owners is much

more frequent to-day than it was a few years ago. The advantages of a control in which the owner feels a personal interest and pride are shown in the greater vigor, freshness and energy of those concerns which approach most nearly to this form of control. The organization which is controlled by a salaried manager, to whom profits and loss are only of an indirect interest, tends toward formality and unprogressiveness. A salaried employé may have character, skill and ambition, but he lacks the interest in the company which the owner has. If the employé has a stimulus which calls forth his personal effort in addition to and distinct from his activity due to a desire to advance in the company and to retain his position as a means of livelihood, there is an approach to the more desirable condition of ownership control. Many forms of stimulus have been tried, few have been rewarded by success. The prevailing tendency to-day, aside from any disciplinary features of the organization is to rely upon human selfishness, ambition and social necessities to urge the employé to an exertion deemed satisfactory to his employers.

102. *Committee system.*—One method that is proving to be more and more a success is the committee system of management. It is an attempt to apply the same democratic principles of government to factory management that have proved themselves so successful when applied to the national and state governments. The primary idea is to enlist the cooperation of the men in the shop in forming plans and offering suggestions for the good of the company. By frequent meetings and a thorough airing of opinions an *esprit de corps* and a feeling of responsibility for the success of the business as a whole is established. In its method this system is

the opposite of the military method of management. The committee system is especially well adapted to furnishing a means by which the discontented can give expression to their feelings, and affords a valuable aid to the management in locating the cause of any disaffection. Furthermore, it is claimed for this system that it provides a method of overseeing whereby an executive totally ignorant of shop and sales processes is provided with reliable data concerning any weak spot in the production, buying or selling departments.

103. *Committees.*—The purpose of all committees is to act as advisory bodies only. The members of the committees should be composed chiefly of the foremen. The chairmen of the most important committees should in most cases be the factory superintendents. In cases where there are assistant superintendents, these may act as chairmen of the less important committees. In practice it has been found that five or six men form the ideal committee. Yet in some cases when it is deemed advisable to have some of the superior officers or factory experts present, the committee may be enlarged, but in no case should the foremen be excluded.

The principal committee is the "main factory committee." Before this body come all the general questions pertaining to the shop. The superintendent acts as chairman. The secretary should be a stenographer and should be selected because of his ability to absorb the knowledge of conditions and to express an intelligent opinion upon them. Such a man will prove an invaluable aid to the executive. Other members of this committee should be selected because of their intelligence and progressive tendencies. The following personnel has been proved to be effective by some suc-

cessful managements: Chief designer of product, chief designer of tools, head of the cost department, and two or possibly three foremen.

One of the special functions of this committee is to advise upon promotions. The superintendent, of course, acts as a final authority in such cases but the fact that no "boss" is to have a chance to recommend a relative or friend unquestioned by the management, frees the minds of the workmen from feelings of unfairness and injustice.

The meetings of the committee should be regular and certain, and although the exact number depends upon the nature of the business, yet in most cases meetings should be held as often as twice a week.

The next committee, or rather set of committees, which follow the main factory committee in importance, are the subsidiary committee or committees. These appear when a company makes not only a main product but also some subsidiary product. Their duties will in general be of much the same nature as those of the general factory committee, but the scope of their work will be limited to the line of production in which they are engaged.

Each committee should be composed of the foremen in that particular line of production together with some of the main factory committee. It has been found advisable to have the same secretary serve on as many committees as possible.

104. *Meetings of the job bosses and foremen.*—An extension of the committee system is seen in those factories where the foremen hold meetings at frequent and regular intervals with their job bosses. Objection to these meetings is raised by some authorities on the ground that it takes the men away from their work and

retards production. In reply to this objection supporters of the system propose that the meetings be not too frequent (twice a month is sufficient) and that they be short and to the point. They claim that any loss due to slackened production will be more than compensated through increased harmony and the dependence which can be placed upon the bosses. In the last analysis they say it rests upon these men to carry out the plans of the management. The bosses control the labor situation in the shop and strongly influence the attitude of the laborers toward their work. Furthermore, these meetings not only afford a good schooling for the bosses, but they offer the superintendent an excellent opportunity for judging the men from whom he must select his future foremen.

The general foremen's meeting is another of those meetings which are thought by some to be unnecessary; on the other hand, many important firms consider it to be one of the most important means of efficient management. The purpose of this meeting is to furnish an expert body before which the various shop practices and policies can be discussed. A foreman in defending some act of his department which has retarded progress will not be inclined to use falsehoods or extravagant arguments if he knows his statements are to be listened to by a body of men well acquainted with all the conditions.

The basis of discussions in the majority of such meetings will lie in the consideration of the departmental records. It is in the defense of these reports by the different foremen that many new plans are suggested which are later developed to the great benefit of the company.

Many devices might be suggested as aids in presenting matter to the various meetings of this kind. One

method has been the use of a folding blackboard. Orders from an executive officer pertaining to some work which is especially desired to be developed under certain conditions is outlined upon this blackboard so that each foreman knows exactly what is expected of him in carrying out the plans. By this means the foreman is urged to do his best for he knows at the next meeting this blackboard will stand as a mute witness of his success or failure in the presence of his fellow foremen and his superior officers.

105. *Work of the committees.*—The work which will form the basis of each committee discussion must be in harmony with the purpose of each committee. The following, however, will be suggestive in showing the fundamental problems which must in some form or other be considered:

1. Routine work and report of progress.
2. New designs and inventions.
3. Cost reductions and economy.
4. Plans to standardize products.

CHAPTER XI

OFFICE SYSTEMS AND REPORTS

106. *Basis of office organization.*—The two physical factors in office organization are the number of people to be employed and the space necessary for them. But numbers and space are not the first things to be considered in planning an office system. Here, as in the factory, the natural functions that are to exist for the best conduct of the particular business must first be determined. The determining of the groups and the work which each group shall do is the first step in the office organization. Lay out the work to be done, determine the number of persons to do it, assign to them their duties and the requisite space to work in, and then erect an "office" around them.

The common type of office organization is described hereafter. Other types are treated in connection with methods of office management in Chapter XII of Part II.

107. *Planning the administrative offices.*—First comes the department within which the general one of administration is to be exercised. This department will embrace all the administrative offices without regard to the fact that the officers may perform specific duties connected with a special department later on.

The divisions in this department must first provide for the handling of all papers and letters received, copies of all letters mailed, and the duties incidental to

distributing, filing and mailing. This department is known as the filing and mailing department.

Another department will have charge of opening and assorting the mail, the stenographic force and so on and may be known as the correspondence department.

The accounting department embraces two separate lines of work; (1) that connected with the commercial end of the business and (2) that pertaining to the factory. Both are under one administrative head, however.

Next in order comes a series of departments which are closely connected with the factory organization. Still in planning an office system the relations of these departments to the general administrative department must be considered. These are the purchasing department, the customers' order department, the producers' order department, the shipping, the receiving and the stores departments.

Under the administrative department which may have a treasurer and an auditor or comptroller as the executive head, come the departments of cost, statistics, invoicing, credits, collections, claims, filing and mailing, office supplies and services, payrolls, customers' order department and shipping department. Such an organization may be modified to suit the particular features of a business, but in general outline it is fairly typical.

The organization of the office has not as a rule been subjected to the same amount of study as the factory; yet there are many firms which have reduced their office procedure to such a state of effectiveness (the activity being so nicely balanced and proportioned) that one may speak of their office methods as being standardized. Such firms have a written constitution and by-laws for their office procedure. These rules are formulated in

simple and direct language by the administrative head for the guidance of the various departments. They are the standard and recognized rules of procedure.

In order still further to promote intelligent cooperation, other devices such as posting a list of departments throughout the establishment, the selecting of a committee upon office administration and the making of charts of administration are employed.

The posting of a list of names that have been carefully chosen generally tends to secure an understanding of the duties pertaining to each department. If all the departments are numbered, as they should be, much time may be saved in sending orders and information from one to another.

Charts of organization make clear the divisions which exist between the different departments. They aid in keeping the members of one division from encroaching upon the domain of another.

The committee system will obviate many troubles arising from a misunderstanding of duties. This system, combined with the set rules for office procedure and the written statement of each clerk's duties and routine work, affords a means of instruction. The committee makes it a part of its work to educate the clerks for better positions and to receive suggestions from them concerning better practice. Firms using such methods make it a practice not to bring outside men to take vacancies. Outsiders are only taken on as juniors in subordinate places. The positions are filled by promotions in the regular staff.

If, however, there seems to be no man among the employés capable of meeting the requirements of the position it is better to go outside for the right man than to change the organization to fit the qualifications of some

person. In order to keep the office force in touch with the general policy of the management the committee may provide for a series of examinations to test the men's understanding of the organization. The employés will then have an opportunity to see the relation of parts from the point of view of the chief executive. Such tests furnish a good basis for judging the employés fitness for promotion.

In connection with the committee system there might be mentioned a committee composed of executive officers for the fixing of the office salaries. The advantage of this method is that it substitutes the experience of several men for one in deciding what shall be the monetary measure of each man's work. Injustice in fixing compensation will do more to disorganize an office force than anything else. This can often be avoided by referring all questions of salary to such a committee. Likewise the charge of favoritism so commonly made against the head of the department—and the staff is continually studying the foibles of the chief executive—is obviated.

108. *Office appliances.*—The office is pre-eminently the place for the originating of orders, the receiving of information and for the distribution and storing of the same. This makes the method of internal communication of great importance. In most offices much time is wasted by the running to and fro, from one desk to another, of the employés in search of information.

One firm has a carefully planned mail system and it illustrates what can be done in this direction in saving time. On the desk of every principal executive officer are three baskets, one for incoming mail, one for outgoing letters and one for the mail that is to go directly to the files. There is a messenger boy whose duty it is to

gather information and to distribute it. One of the prime requisites of this messenger service is that it shall be regular and frequent. Besides a gain in time there is the added gain due to the habits of concentration which are formed. The employé soon learns to depend upon the system and he is not taken from his regular work to run about the plant.

This system of communication is aided by a pneumatic tube service and by a system which makes it possible to gain access to the files, to the office library, and to the catalogues and other sources of information.

It cost a certain company \$20,000 to put in the system, but it was found that the service paid for itself the first year. The office force of this company consisted of 150 people and its factory employés numbered about 2,000 men. It was found upon investigation, before the new system was put in, that there were twenty-four places where letters were stored, and these were distributed over six floors of two buildings separated by a distance of 100 yards.

Modern office practice has developed many time and labor-saving devices. Card systems and loose leaf systems in connection with the carbon copy have made it possible to do away with duplicate entries of the same information, and the modern voucher system has greatly reduced the labor of book-keeping and other recording devices for keeping information as to payments and so on.

109.-*Standard forms.*—One of the most important things is the standardization of forms. This has reference to size, ruling, disposition of matter, the facts to be put on the forms and the quality of paper. The first consideration in designing a form is to decide what facts are to be represented there. The size of the paper

should depend upon the amount of information, and the arrangement should not be forced into an illogical form because of some preconceived idea as to size and shape regardless of the nature of the information. Neither should the quality of the paper be left to the printer. Current information can go on cheap paper while that meant for permanent records should go on the best quality. The question of uniform ruling is very important in the matter of saving time. A clerk can do fifty per cent more work upon forms that are standardized because he becomes familiar with the spacings and types.

Another feature of office method pertains to the selection of binders and card cabinets. Here again a standard type should be adopted which will apply throughout the establishment. This provides for the shifting of a cabinet from one department to another, and allows it to be used for another purpose should an occasion arise.

Many devices might be named that are used in offices to-day but most of them such as the addressograph, calculating, listing and billing machines are too familiar to need description. These mechanical devices are generally expensive, but in large offices they are almost indispensable and effect great saving.

110. *Reports.*—There are two kinds of reports, special or emergency reports and regular reports. It should, however, always be remembered in their compilation that nothing but information germane to the title of the report should be included, and that no reports should be made at all which have not some definite purpose.

A report implies a maker and a receiver. The latter generally represents someone in authority who is to use and pass judgment upon the information contained in

it. Therefore, the function and purpose of the man who receives the report should determine its character and contents. It is not necessary, for instance, to give the head of the selling department a report embodying the detailed costs of production of the articles he sells, nor is it necessary to give the superintendent or foreman a number of reports that pertain chiefly to the value of goods. Mr. James N. Gunn, one of the leading authorities upon office systems and practices, lays down the following rule: "To every man in the organization should be given only that information that his position determines he can use—not the information he may be curious about."

111. *Factors deciding who should make the reports.*—In determining who should compile a report the executive head who has the power to demand it should first investigate the opportunities which each person has of gaining the information which is desired at the office. Much useless data is forwarded to the head office by foremen and superintendents because they are requested to send in monthly or weekly reports without any consideration of their fitness to secure reliable facts.

112. *Contents of the reports.*—It is difficult to generalize, but two things should always appear when possible: (1) physical data, (2) financial data. Many schemes for gathering statistics for operating purposes fail because the reports contain financial data only. All of the costs, whether for labor, material or overhead expense are expressed in terms of value. Then too the report should contain facts that are comparable, and all should relate to a central fact. Each report should make a complete unit. The reports made to the general manager of a large company manufacturing twenty-five per cent of all the car wheels in the United States

shows that he receives each month the balance sheet, and loss and gain accounts, the costs of the various processes, not merely in terms of money, but in physical terms, showing the number of pounds of metal poured for every good car wheel, or for every hundred pounds of car wheels actually delivered to customers. In addition he gets special reports bearing upon some particular "diseases of car wheels." Other reports showed that he had a record of his men's efficiency as well as records of his machines and the plant.

The purpose and source of any report should decide the nature, the form and arrangement of its contents. As the conditions which govern the purpose and the sources vary in different businesses, it is impossible to describe any one system of reports which will be applicable to all enterprises. Nevertheless there are a few fundamental ideas which underlie the structure of the principal reports which are meant for the eye of the executive as an aid in the determination of his business policy. The two main purposes, therefore, from the point of view of the executive's business policy, will be the determination of the conditions under which the factory is producing and selling its goods. Before any manager can intelligently interpret the conditions as they are represented by actual operation, he must have some standard with which to compare these actual results. Such a standard may be gained by first determining what must be accomplished in the production and commercial ends of the business in order to net him a fair profit.

In arriving at a basis to be used as a standard of comparison in the process of production, the executive should have reliable methods for determining the character, volume and regularity of the output, the progress of inventions and new ideas which make for greater ef-

iciency and lessening of costs, and finally the cost of production. In determining a similar standard for the commercial or sales department, methods must be adopted for calculating the character of the market, that is, what profit must be obtained and what volume of business must be secured and what expense can be allowed in order to make the profit. This would involve considerations of each class of goods manufactured, their sales in each territory and the expense connected with the holding of supplies while they are being marketed. The function of reports, therefore, should not only aid the executive in arriving at the necessary information which gives him a firm grasp upon the technique of the business, but the compilation of the report itself, should help in the accomplishment of the results. This last function will be best promoted through some system in the collecting of data and the preparation of the report by which the men responsible for the direct supervision of the manufacturing and selling departments can be brought into intelligent and sympathetic coöperation with the policies and ambitions of the chief executive. Where the committee system has been employed as one of the essential features in factory organization, many reports which would otherwise involve much time and expense in their preparation can be quickly and easily made out by using the various committees as the source of the information. The reports under such conditions are made up whenever possible by the committee handling the different branches of the product. "You may be sure," says Mr. Carpenter, former president of the Herring-Hall-Marvin Safe Company, "that your committee, composed of enthusiastic men whose reputations are at stake, are going to see that these reports represent the very best that they in

the shop can accomplish, when they know that these will be closely scrutinized by the heads of the company."

There are four general kinds of reports—(1) those of the profit and loss, (2) those of the factory, (3) those of the sales department, and (4) the cost reports. Generally speaking these should be so arranged and timed that each will serve as a basis for comparison with the others. For example, the executive profit and loss report when compared with the selling department reports should prove a valuable index to business conditions, and when considered in connection with the data in the factory reports, a monthly balance sheet may be constructed.

113. *Executive report.*—The profit and loss report is of the greatest importance. Upon it are founded all others. It is produced monthly and its data comes directly from the firm's books.

The data in the report should be so arranged as to permit the ready comparison of those items which show the relative standing of the different branch houses of the firm. If the concern has branches in Chicago, New York, and also in some of the minor towns, these names might well head three separate columns under which would appear the result in dollars and cents of the month's activities pertaining to the various items of income and expense, cost and profit. The items should be classified and each classification should be given its total as well as itemized statement. Thus there should be spaces for "deliveries" (classified) and total "deliveries," for "factory costs," for "all other cost charges" (classified e. g. freight, storage, etc.) and total "all other costs." All these costs may now be considered as total "delivery costs." "Gross profit" will be next; and the two items of delivery—costs and gross profit—thus

standing together, are in the most favorable relation for comparison. Continuing down the column the next broad classification comes under "selling expense" (classified).

Salesmen, salaries and commissions.

(Dep'ts.)

(a)

(b)

(c)

Salesmen, expenses.

(Dep'ts.)

(a)

(b)

(c)

Managers, salaries

 " expenses

Advertising

Total "selling expense"

The next general classification embraces:

"General expenses" (classified)

Office salaries

Rent, insurance, taxes

Postage, telephone, etc.

Stationery

Light, heat, power

Maintenance

Adjustments and losses

Attorney's fees

Miscellaneous

Total "general expense"

The total selling and general expense may also be given as embracing the last two related items of costs

and finally the last item in the column will be the "profit" or the "loss."

A careful analysis of the above report will show where the greatest profits in the business were made and where the losses occurred. Any change in the expense items from the normal can be readily detected, and to facilitate this, extra columns for percentages might easily be constructed.

114. *Report from the selling department.*—The purpose of this report is frequently and regularly to put the executive in possession of the chief business facts connected with the selling division. He needs these reports in order that he may push forward for more business or perhaps that he may the better direct the credit and collections. As a basis for judging the actual sales made and the actual expenses incurred there should be carefully worked out and included in each report the required sales necessary for the success of the business and the expenses that can be allowed. The "required sales" and "allowable expenses" should be calculated by a man thoroughly acquainted with the business and after a careful examination of the conditions under which the firm must work in each territory; the profit which the firm should make and the difficulties of getting business will then stand in a truer relation to each other.

The same standard form embracing the same data can be used in preparing the report upon the estimated sales and expenses as that employed for showing the actual sales and expenses. By so doing a comparison of the business "realized" with the "allowable amounts" is facilitated.

The items which will form the basis of the sales report will be as follows:

1. Each branch of the concern will be reported upon in regard to all items.
2. Percentage calculations for each item.
3. The volume of sales required or made (classified).
4. The factory costs allowed or incurred (classified).
5. Extra costs of every character, allowed or sustained (classified).
6. Gross profits, required or made.
7. Selling expenses, allowed or incurred.
 - (a) Classified—
 - (1) Salesmen, salaries.
 - (2) Salesmen, commissions.
 - (3) Salesmen, expenses.
 - (4) Managers, salaries.
 - (5) Managers, expenses.
 - (6) Advertising expenses.
8. Total selling expenses.
9. General expenses, allowed or incurred.
 - (a) Classified—
 - (1) Rent.
 - (2) Insurance.
 - (3) Taxes.
 - (4) Telegraph and telephone.
 - (5) Office salaries.
 - (6) Legal.
 - (7) Miscellaneous.
10. Total general expense.
11. Total all expense.
12. Net profit, required or made.

The advantage of the two reports to the executive for purposes of comparison, one showing the results desired and the other the actual accomplishment effected by the selling division, needs no commentary. There are, how-

ever, other advantages gained. The sales manager can see for himself without a special interview with the executive what must be done, and by comparison he observes with what success or failure his policies have been rewarded. These reports also furnish reliable information as to trade conditions and such knowledge is of prime importance to the chief executive in directing the general policy of the firm. Especially valuable are these reports to a firm which does a business involving long time contracts under which deliveries are made long after the sales are recorded.

115. *Factory reports.*—Reports from the factory may be as numerous and as varied as the desires and fancies of the executive may impel the factory managers or committees to prepare. We will, therefore, confine ourselves to the description of such reports as fit in logically with the reports selected from the other departments. A report, for instance, that throws light upon the executive's profit and loss report, showing the source of certain gains or losses, is very desirable. The production and efficiency report is such and may be made a valuable guide in determining the efficiency of the factory as a whole or of any department in the factory. This report should be so constructed that the results for various periods may be compared with each other, either as a total or an average. In order to establish a normal or standard result the averages of a preceding period of, say, six months may be taken. With these averages the present weekly or monthly results may be compared.

The data which should be entered upon the efficiency report will be as follows:

1. Date, week or month ending.
2. Number of employés.

3. Output.
 - (a) Number of machines.
 - (b) Value.
4. Hours worked.
 - (a) Total.
 - (b) Overtime.
5. Payroll.
 - (a) Piece work.
 - (b) Day work.
 - (c) Percentage of jobs reaching standard time.
6. Material purchased.
 - (a) Directly.
 - (b) Indirectly.
7. Inventory (classified).
8. Miscellaneous charges (classified).
9. Factory balances (classified).
10. Costs.
 - (a) Material.
 - (b) Labor (classified).
 - (c) General wages.
 - (d) Total.
11. Increases or decreases.
 - (a) Where?
 - (b) Why?

By comparing the results as recorded in the above outline with previous reports of the same kind, the present efficiency of the factory or any department may be easily calculated. This comparison of present costs and values with previous costs and values shows where each gain or loss has been sustained, while a comparison confined to items within the single report, although it may show a total gain or loss, would not disclose the particular cases. For example, we may compare the figures representing the number of employés, payrolls and ma-

terial purchases with the value of the output and the inventories. Such a comparison would not show whether the gain, if there were a gain, is due to greater efficiency in the production or purchasing department. With this report before him, the executive is put into possession of a knowledge of the relative strength of the concern as a competitor for business. That is, he will know his profit as a producer, and with this as a basis he can gauge his strength in the commercial field. Normally, there should be a considerable margin between the cost of the finished product and its market value. Thus as the product leaves the production end of the business and enters the commercial field the manager by the simple process of subtracting the cost of production from his estimated selling price, can allow for the expenses necessary to sell without depriving himself of his profit.

116. "*Progress report.*"—Another report from the factory is the "progress report." This comes to the manufacturer weekly, and if the concern is one which handles considerable contract work such information denoting progress, becomes of great importance. Given the conditions under which the product is advancing toward completion the manager can put pressure at the right spot at the right time and so avoid threatened delays and tardy deliveries. There is no support which the factory can give the selling department that is more important and more appreciated by the latter than the setting of delivery dates which can be met. Some firms in pushing a new product take orders ahead. But the ability to meet delivery dates should be first carefully considered.

The following form embodying the items contained in the report is given as a model: ¹

¹ Taken from "Profit-Making Management," by C. U. Carpenter, page 142.

FACTORY "PROGRESS REPORT"—WEEKLY.

Date

Condition of Orders (classified).		General.
Drawings % done.	Material % received.	
		In these columns place the different classifications of each contract, showing % finished.
		Signed — Committee. (by Sec'y).
	What is shipped.	
	Must Ship by	
	Must Erect by.	
	Date of Order.	
Factory Order No.		
Description of Order (briefly).		
Name and Location of Customer.		

“Such reports,” says Mr. Carpenter, “covering a very wide variety of work, have for a long time been made out by our factories on Saturday morning, arriving on my desk the following Monday. Meetings with interested heads of financial and sales divisions immediately follow, and as a result the closest possible touch between the several divisions upon the one important point—Production.”

117. *Cost reports.*—These reports are treated in full in AUDITING AND COST ACCOUNTS, but as a part in the general system of organization their importance should not be overlooked. Not all manufacturers are willing to go to the expense of gathering accurate cost and stock data, yet all recognize the aid which fully analyzed cost figures would give them in checking up the various departments. Says one successful business man, “Let one of the higher officers bring into a committee meeting, or a general foremen’s meeting, a set of fully analyzed cost returns upon some particular line of the product, and begin to inquire of the different foremen present why their share of the expense amounts to ‘so large an amount,’ and there will usually follow a heated discussion that will throw many a valuable side light upon the cost of production.”

118. *Period covered by a report.*—Two things must determine this: (1) the kind of organization, and (2) the sort of men in the organization. The operating reports are generally made weekly i. e., the payroll period. A statement such as the profit and loss account usually appears semi-annually or annually although many concerns favor a monthly report.

119. *What should be done with reports.*—It should always be kept in mind that a report is for business and not for historical purposes. “A good test,” says Mr.

Gunn, "of the usefulness of any report is to see, after that report is placed in the hands of the proper executive, whether anything happens as the result of action he may take based upon the information contained in the report." If the concern has adopted the committee system there is no point in the organization where the benefits of such a method will be better displayed than when it is brought into use in a discussion of the various reports. The reports having been made out and forwarded to the executive, the makers of them are naturally anxious to see what the outcome will be. Any suspicion that a report may be put aside and forgotten breeds a spirit of indifference that will invalidate the correctness of every succeeding one. But if the understanding is general that the heads of departments are to be called into conference upon important reports, each person concerned with the report will do his best to make a good appearance. In considering any of the executive reports mentioned above the committee might consist of the president, the treasurer or accountant, the general manager, the factory superintendent and the sales manager, together with such heads of departments as may be immediately concerned with the results of the discussion.

Such a committee meeting should proceed under due forms and according to some definite program. The president acts as chairman and the various reports are considered in order of their importance. Generally this will be in accordance with the ranking importance of the officers. Accordingly the general manager presents a critical estimate of the general business situation of the firm. This may involve the sales manager, provided there is a general falling off in some direction, and he will be called upon to explain. If the conditions are

beyond his control, such as some new form of competition, it rests with the committee to suggest the best means for meeting it. Each item of the report is taken up and discussed likewise. The executive report is followed by the reports of the sales manager. He may suggest an improvement in the product as demanded by the trade or some feature of the expense items may need to be defended. The same general discussion follows this report as it does all others.

The factory superintendent must in his turn stand sponsor for the reports pertaining to output and efficiency, progress of work and improved methods and inventions.

If the treasurer heads the general financial as well as the accounting department he will be expected to deal with matters pertaining to credits and collections—especially where those matters are influenced by the rate or date of delivery as stated in the “progress of work report.”

This immediate and definite action upon the reports is supplemented in its effect by the publicity given to every item, and if human nature can be counted on to slight these reports where no notice or tardy notice is taken of them, it can be likewise depended upon to put forth its highest efforts when due credit and importance is shown to be attached to them.

PART II: BUSINESS MANAGEMENT

CHAPTER I

PRINCIPLES OF MANAGEMENT

1. *Cardinal elements of management.*—Management implies three things—a force, a purpose or result to be obtained, and a director of this force toward the desired end. If any one of these three things is omitted in any activity, no such thing as management is possible.

A baseball team illustrates this statement. The members represent the force to be managed. Each player is a human dynamo. The winning of the game supplies the purpose and the captain directs the general play to this end.

The extent to which the word “force” is used to name the body or machine employing force is significant in itself. We often speak of the “police force,” the “working force,” etc., when we mean the body of men which supplies the energy or force to be used in carrying out any project.

2. *Every principle implies a force.*—The most important thing about management then is that it deals with forces, i. e., energy. This fact alone raises business management into the realm of those subjects worthy of being treated scientifically. “Scientific management” would be meaningless jargon if forces were not involved. And it is well for the business man who has thousands of dollars invested in plants, offices, men, fixtures, etc., to realize this point at once. It will enable

him to discriminate between the real efficiency engineer and the fake systematizer. The latter knows nothing of *forces*. He knows only of *forms*. The man who knows and realizes the nature of the forces working in a modern factory or mercantile establishment is conservative. He realizes the consequences of getting in the way of these forces. A fool will try to stop a flywheel with a piece of pink cardboard. Yet, simply by reason of his assurance born of ignorance, he may gain the ear of an executive. The manager who thinks of his business in terms of the forces which he is guiding can soon put to rout the "business doctors."

3. *Nature of business forces.*—The promoting of a business enterprise is at bottom nothing more or less than an attempt to bring the forces of capital, of labor and of land together in just those proportions and with such effectiveness that the highest profits will result from their combined efforts. There is no common business name for the manager of such an enterprise in the earliest or formative period of an undertaking. The economist calls such a man an enterpriser. If the title of "promoter" had not become so closely associated with the raising of capital or effecting combinations of capital to the almost total exclusion of the other two forces of business, this name would more fully express the function of such a person than any other word. But whatever his name, such a man is a manager *par excellence*. His plans involve the primary union of the three business forces, capital, labor and land. Poor management at this point means hampered production, poor distribution or lean markets after the business is set going.

Let the reader adjust himself at once to this new point of view that management is interested in forces

and not alone in things, methods and forms. If the idea seems abstract that management begins before the money is raised or the factory started, the notion can be given a concreteness by thinking of the number of failures of managers of production whose efforts and plans were useless because some incompetent enterpriser had started the business with too little regard for his labor supply. Or it might be well to look into the history of many managers of distribution, men who were doomed to failure from the start because some enterpriser had overlooked the important part which location bears in relation to freight rates or delivery advantages. Or, again, the reader may find numberless examples of good sales managers whose efforts were handicapped for years because they could not develop their markets through a lack of sufficient working capital.

Management, then, deals with the three sources of force or energy—capital, labor and land. From the very moment when these three agents are brought into a business by the enterpriser until the producing, the selling, shipping and recording of the results have taken place, all of these factors are present. The management should never lose sight of their important influence. A strike which involves trouble with the labor force may mean many hours of anxiety for the manager but the labor loss may be as nothing compared to the capital losses in interest, depreciation and market disorganization incurred during the shut-down.

4. *The manager must direct forces.*—The complexity and extent of the workings of a modern factory are forcing the question of management to the attention of both stockholders and the public. The stockholders are interested in their profits. The consuming public is troubled about the high cost of living. Both are be-

ginning to believe that their interests could be better served if the managers of production were specialists in management rather than composites of abilities ranging from the requisites of a good office boy to the accomplishments of a mechanical expert.

A manager must direct forces. He cannot be tied to the details of an office, of a department or of an organization. His special work is cut out for him by the forces which he handles and the object which he must attain in their direction or management.

The mechanical engineer, the electrical engineer, the locomotive engineer, etc., have their own special provinces. Each is a specialist in the control of his particular form of power. But it has often been expected of managers of production that they be not only technical experts in various branches of an industry but that they be expert handlers of men and judges of business methods as well.

The discussions and investigations of big business operations during the past few years have so focused attention upon the manager that we are able to see his true relation to the organization in a better light than ever before.

The Universal Audit Company of New York shows the relationship of the two chief forces with which the manager must deal in a very simple way in the chart on the following page.

It will be here observed that the capital, land and labor forces have taken the form of plant and equipment, materials, supplies and men. The manager, therefore, has jurisdiction over these things as well as charge of the inspection of product and purchases. The two types of physical energy which are most evident in production and which the manager must control are

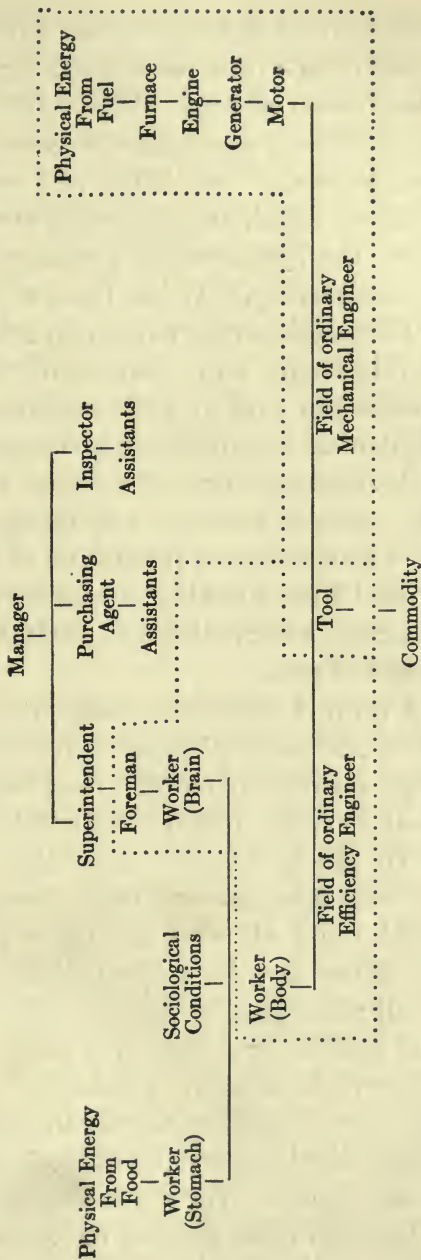


FIGURE 1.—CONTROL OF BUSINESS ENERGY.

those produced by fuel in conjunction with a machine and those which come from food when converted into the muscle and brains of men. When the full importance of these factors in management is realized, it becomes evident at once how futile are systems and schemes of control which only provide records of results, but ignore the forces which produce results.

5. *Human engineering*.—It has been supposed until very recently that engineering had to do solely with the intelligent development and control of that energy which depended upon fuel and the machine. Accordingly, the mechanical engineer early became a recognized aid in the management of a plant and factory. But now that business men are beginning to analyze their productive processes, the profession of engineering has been extended to include the development and control of that energy which displays itself through the minds and bodies of men.

A study of Figure 1 shows the main lines of activities which these two forms of physical force follow. The physical energy coming from the food which a man eats shows itself in either bodily or mental activities of the worker. In the factory we may thus divide the workers into brain laborers and body laborers and so throw into bold relief at once the basic problems of management. These are the prime factors which lie at the bottom of all permanent productive efficiency. The managers must find the best way to develop this human power and conserve its energy. Looked at in this light, it is not a matter of indifference to the management what the foremen, the laborers and others eat and drink outside of factory hours. Nor is it compatible with the principles of business management to ignore the sociological conditions which surround the workers at home

or in the shop. Anything which dissipates the energy of the worker is a handicap to the productive efficiency of the factory. Welfare work, medical service, industrial betterment are growing and spreading among the world's great industries. This happens simply because it is good business policy. If welfare work succeeds, it does so because it develops and conserves the human working force. It pays for itself in productive efficiency and not merely in its advertising possibilities.

6. *The basic principle in management.*—Little need be said about the power which manifests itself through the aid of machines. This force in production is very evident and its utilization has been the point of attack for over a hundred years or more. In fact, so much attention was given to this factor that the managers of great enterprises overlooked nearly all the other elements in production. To get a new piece of equipment, a machine, a filing cabinet, an adding machine, seemed to mark the climax of many a manager's ambition. Concentration upon this single side of the proposition has brought its penalties as well as its rewards. Managers fixed their eyes upon the size of their output. Bulk, production on a large scale, tonnage, became the great words in managerial circles. To get this result the machine was developed to the highest point. Mechanical invention was the only thing considered and the mechanical engineer became the most important member of the staff of managerial experts.

But finally the machines became so plentiful, the factories covered so much space, the output got so large, the employes numbered so many thousands, that the energy which was developed and directed by means of the mechanical equipment began to be lost and wasted. The old standards of achievement could not be main-

tained and the management began to ask itself the reason. The inquiry led to the basic principle in management which deals with the conservation of energy and the correlation of the forces of production. When this point was reached many problems arose which had not up to that time intruded themselves. For example, the question of fuel supply was no longer a question of weight but of heating power. The belting problem was no longer a question simply of price per foot, but of lost power through inattention to the proper belt tensions, etc. And thus we might run through the whole list of problems of management and find that in their last analysis they all resolve themselves into terms of power, force, or energy.

7. *The purpose of management is profits.*—Perhaps this point does not need emphasis, but it is well to draw attention, while so much is being said about the methods of gaining productive efficiency, to the fact that the ultimate purpose is profits. A saving of energy formerly lost or the institution of a frictionless organization may have other purposes than increasing or maintaining the profits; but unless these things bear upon this element somewhere in the course of the firm's operations they should be counted up to the concern's philanthropies or advertising and not to its productive management. The manager or efficiency engineer or whoever he may be who cannot organize or reorganize a system of management without sacrificing permanent profits has not the faintest conception of the nature of his work. Such a person is generally trying "to install a system." However, it should be borne in mind that a thorough-going plan of management may and, for that matter, generally does involve an outlay of money which may not immediately show returns. The con-

struction of a suitable foundation for a building may not show its advantages over a flimsy structure for several years, yet a wise business policy would not sacrifice the permanent profits for the sake of immediate savings.

8. *Immediate versus future profits.*—No one business policy has caused the wrecking of so many firms and the shattering of so many managerial reputations as that of paying dividends regardless of the means or source of income. A manager must gain the profits by putting the materials and forces of production through certain processes. The legitimate gains of his activity as manager show in a product of higher value. He starts, we will say, with a ton of iron ore and after many smeltings and purifyings and temperings, thousands of fine steel springs are produced. So long as quality determines value, and value determines price, the manager's duties are to shape his methods toward meeting and maintaining that market, the judgment of which passes upon the quality of all products. He, therefore, turns out steel springs of a quality that satisfies the particular demand for that product. His influence upon the profits will show in maintaining the quality demanded by the customers and in his ability to effect economies in the use of the forces of production and the handling of his productive organization.

But, being urged to show immediate results, many managers have tried to short-circuit their forces of production. Instead of putting the capital meant for materials, new machines, new roadbed, new cars, etc., into these investments of production—investments which would have brought profits in the future—some managers have short-cut the process and put the capital directly into the dividends. The "skinning" of many rail-

road properties and industrial plants by this "short-circuit" process was too common a few years ago. It is not unknown to-day and it is a very alluring method for a young or inexperienced manager when a short-sighted directorate insists on "results."

This practice of sacrificing the permanent profits for the immediate "showing" is not less fatal when applied to the business organization of a company than when used to "skin" the equipment. Poor routing of materials through the shops, stock timekeeping, persistent soldiering, bungling storekeeping, etc., may mean a very cheap organization for a certain period but the effects of such disorganizing elements upon the output of a plant will prove in the end to be even more damaging than the mere skinning of the capital or equipment.

9. *Difference between manager and engineer.*—Management, therefore, involves not only the forces of production but careful consideration of the results to be obtained, i. e., the profits. It is this latter purpose which distinguishes the man with managerial ability from the purely technical man. The mechanical engineer may be able to control and develop the productive forces in a plant. In fact, a specialist of this kind is absolutely necessary. But his point of view is narrowed to the activity of the machine and the machine's tender. He is interested in supplying power and machines for getting out articles according to certain dimensions and specifications. The manager must be able not only to judge the mechanical necessity of this activity but also to estimate its effect on the commercial end of the business. Commercial appraisal must supplement technical judgment. Many illustrations of this difference in abilities might be cited from the experience of shop men who have seen many a fine ar-

ticle from the engineers' point of view sent into the factory, only to be torn to pieces and ruthlessly changed by the manager who had to meet commercial conditions.

10. *Specialization complicates management.*—Specialization is both a result and a cause of machinery; therefore, we find the two developing side by side. So far as the modern industrial organization is concerned, it makes little difference whether we speak of it in terms of specialization or in terms of machinery. A study of any industry will soon show how complex its organization has become, due to the number of specialties into which every process is divided. Generally each division requires a new machine or tool. If we compare the present organization with the organization of a similar industry of fifty years ago we discover that although the number of men necessary to produce a given quantity of product has greatly diminished, the quantity put out under one management has itself so increased that the number of employes has increased and the number of machines has multiplied accordingly.

The manager has been engulfed in a sea of industrial specialization. The correlation of all these special activities has overtaxed the abilities of managers for years, that is, where they have given this element of management the consideration it deserves and not simply stumbled along trying to meet every difficulty by adding a new machine—a method not unlike that of a tired man urging his flagging energies to new efforts by taking stimulants. They get him over the present difficulty but they leave him not only debilitated but hindered by the addition of the drug itself which clogs his system.

11. *Specialization in management.*—Not so many

years ago it was the custom to defend the advantages of specialization against the virtues of all-round skill—the expert against the all-round man. But there is little argument to-day. The economic superiority of the expert is too much in evidence to allow any argument. The “jack of all trades” has disappeared. The change makes for special dexterity and great saving in time and money. Preparatory expenses are greatly reduced and much time in changing from one job to another is saved.

To-day there is a new form of specialization going on, which being more difficult to represent in a concrete form is not so easily understood nor so readily accepted by the manager. We refer to the specialization taking place in the field of management itself. Some firms instead of employing one foreman to look after a whole department are breaking up the work into several parts and are putting specialists in charge of each. Thus there may be a gang boss, a speed boss, a disciplinarian, where once there was only a foreman. As it is not easy to figure the results of management specialization in terms of a machine’s output—a concrete thing which can be shaped and handled and measured—many executives are backward in recognizing the same economies here that they have so eagerly exploited in the field of technical and mechanical specialization.

12. *Department specialization.*—Between the two extremes of specialization, that of the machine at one end and that of the management at the other, comes an intermediate type of specialization. This may be called departmental specialization, and often serves as a step to the more advanced form of specialized management. This intermediate type is illustrated in the Pierce-Arrow Motor Car Works. Here all lathes are divided

into groups and subgroups. The main groups are put into departments by themselves and are there arranged into subgroups according to the size, class of work, etc. For instance, one section is known as the turret department and is divided into subgroups of automatic chucking machines, automatic screw machines, flat and hexagon, turret lathes and hand screw machines. The larger turret lathes of the Gisholt type are not included in the department, but form separate groups. The hand and spur gear cutters form separate groups. The millers are classified as vertical, horizontal, Lincoln type and hand groups. The drillers are divided into radial, heavy duty, medium and sensitive groups. The grinders are grouped as internal, plain and surface. Specialized supervision is thus naturally induced to a limited degree, for an assistant foreman is put in charge of each subdivision of machines and is responsible to the foreman who has direct charge of the departmental groups.

The necessity for this growing practice of departmental grouping is due to the great burden which extensive specialization in the agents of production has put upon the manager. Departmental grouping is an attempt to bring as many common factors as possible into one group for purposes of supervision and thus provide a more efficient means of watching the wastes and coördinating the efforts of many individual and highly specialized machines. The experiment of the Pierce-Arrow Company shows a practical application of the economic principle that coördination is a necessary complement to specialization if the highest efficiency is to be obtained.

13. *Cooperation and specialization must go together.*
—Just as the forces of a business must be correlated, and the machine processes co-ordinated, so must the labor-

ing force cooperate in order to let specialized employment and divisions of labor produce their full results. The enormous product turned out by the factories and transportation systems of to-day is possible because the machine has developed into a specialist of the highest type. However, specialization does not stop with the factory processes, the warehouse, the bank or the transportation system. The management of these various business activities is dividing itself more and more into specialties. Instead of one man trying to do all the work of managing a factory he has called to his aid superintendents, foremen, and bosses.

This is the predominant type at present but it is rapidly becoming modified. The machines, the men, the departments, the responsibilities of a large factory are so numerous that further specialization must go on if this century is to keep up with the last in producing goods.

The duties of the superintendents, the foremen, etc., must be broken up into a number of specialties and each given into the hands of men trained to guide and direct these particular activities. We see the beginning in the case of the superintendent who is no longer expected to be an expert draughtsman, nor is it thought necessary in some shops for the foreman to be an expert machinist, a toolmaker and a practical psychologist in the hiring and firing of men.

14. *Is there a science of management?*—There is no word in the English language used with greater disregard for exactness in meaning than the word science. We speak of a science of astronomy and also of a science of salesmanship. If astronomy, with its well determined principles and its power of forecasting results by means of them, is a science, then salesmanship can lay little

claim to such a title. But if we examine the nature of salesmanship and discover that its propositions are founded on the determination of certain mental *forces*, then we know that the claim of salesmanship to be called a science does not rest upon the progress which has been made in the exact determination of the forces and their action, but upon the discovery that salesmanship deals with the laws of force and energy. It might perhaps be better if we did not speak of advertising, salesmanship, etc., as sciences since the implication is that they have reached a degree of exactness similar to that attained in those physical sciences upon whose laws so much of our modern industry depends. At present the various branches of business activity have not been reduced to the category of exact sciences. About all that should be claimed for them is that some parts of the business field, such as salesmanship, marketing, management, have adopted scientific methods in their attempt to study the nature of the problems before them.

15. *Scientific methods of investigation.*—So far the discussion has grouped itself about the proposition that all scientific knowledge rests upon one great underlying principle—the conservation of energy and the correlation of forces. There are, however, two ways in which a subject may be studied. These may be called the “speculative” method and the “practical” method. The first of these has been largely instrumental in the development of the sciences of astronomy and biology, and the second has been chiefly employed for investigations in chemistry. Sciences differ among themselves in the extent to which one or the other of these methods is used; and it is essential that a new science adopt as soon as possible the method most suitable for its development. So far as management is concerned, both

methods are applicable to a certain degree, but the practical method, in which experiment is the basis of drawing scientific conclusions, is the method which must predominate.

There are only a few deductions which can be employed in the science of management. Such as they are, they are most important since they serve as goals toward which the experiments in and analysis of factory, shop and office conditions may work. This goal is the avoidance of waste and the gaining of increased power by a thorough knowledge of men, machines and conditions. If investigators of management problems would only keep this one idea clear, they would then be at least in the right attitude to begin their study. With this goal in view the investigator can then follow the practical method and not confuse his principles with the mechanism. Such an investigator will hold the factory or shop at arm's length and not feel bound by traditions and prejudices. He studies the departments as a whole and compares them with his knowledge of other plants. This method enables him to analyze the proposition into units which permit of numberless experimental recombinations.

All this takes time and patience, for superficiality has no place in any science. Mr. F. W. Taylor, for instance, to achieve one result, performed 50,000 experiments all of which were recorded, studied and classified; they involved an outlay of material amounting to 800,000 pounds of steel and an expenditure of \$200,000 in money. The same care and attention must also be given where the data to be collected pertains to men and not material. The laws of fatigue and rest are even more complex than the laws of materials. It is not till these laws have been discovered that standards of pro-

duction can be established and methods set forth for their accomplishment.

Having once got the general proposition in mind, the management investigator can go after his facts. These he will carefully select after observation and experiment and then formulate those laws by which he can select his machines, material and men. Some laws will become standards by which the working men in any particular department may be scientifically selected. The men who are physically or temperamentally unfitted to perform the duties in that particular department may be taken out and fitted into some other place more congenial to their particular abilities. Redistribution of men of this kind results in a total increase of efficiency without drawing forth more labor energy from men and machines. The results will show not only that a scientific method was used but that a scientific object was obtained.

16. *Continual study and progress.*—A first practical rule in the application of this scientific method of adapting the instrument to purpose demands not only a redistribution of responsibilities but the establishment of intimate cooperation between managers and men. This may be called the rule of sympathetic coöperation in which there is “mutual recognition of the possibility of mutual helpfulness.” An example of this practice is seen in those shops where the chief distribution of functions consists of dividing the purely mechanical and muscular operations from those requiring brains and planning, and then selecting men who are particularly fitted for each kind of work. This division and redistribution of the functions necessitates a greater degree of planned coöperation between the two groups than was found under the old style of management. Under the

old system the workman is left to determine the method of doing his work as well as the performing of the actual job. Under the system where the function of planning is separated from the performance, the method is given into the hands of an expert body of planners and the workmen are left free to apply all their energy to the one thing—the doing of the work.

Scientific management, however, does not rest with experiments alone. It requires that the facts having once been obtained should be used for the continual advancement of the organization. The first rule for the practical administration of the laws and principles which have been deduced should be the selection of proper instructors to teach the men upon whom the production of the plant depends. Under this rule a workman once discovered and assigned to a duty to which he is especially adapted is kept at his highest point of efficiency by being continually helped and taught how best to do his work. The factory thus ceases to be a “mill” and becomes a school instead.

A law is limited by the circumstances which condition it. Before any specific devices are discussed by which a business enterprise may be changed from a “hit and miss” sort of management to one under a system of carefully studied control and direction, it may be well to throw out this caution. Although a law once formulated is fixed by the conditions which made it, there is no assurance that the conditions will not change. In fact conditions are ever shifting and as a consequence new observations and new experiments will result in the derivation of new laws. No manager should assume that any conclusion he may reach is final. A rule of action which may guide the organization to-day to higher planes of efficiency may later be rendered obsolete by

a new set of conditions and higher standards of accomplishment. The manager who approaches his subject in the spirit of a scientist never stops because a cost has been reduced. Nothing is final with him but the possibility of further reductions and the discovery of new and important laws by which these reductions may be made.

17. *What the science of management involves.*—A science of management involves a natural force, an inductive method of study and a distribution and grouping of activities according to functions.

One of the great difficulties in getting business men to see that management is anything more than just "common sense" is their disinclination to listen to anything which smacks of theory or principles. They assume that common sense deals with concrete things while theory deals with abstractions. The truth is that common sense is not disassociated from theory. The thing which people call common sense is simply the working out of the theory or principle through concrete things. The phenomena being familiar and the causes and effects being in harmony with ordinary experience, the proposition is spoken of as simply common sense. The trouble arises when the ordinary man mistakes the illustration of a fact or principle for the principle itself and thinks he has dodged all responsibility for thoroughness of investigation and carefulness in recording and studying data by calling the whole thing simply a question of common sense. To the janitor the putting of salt on an icy sidewalk is simply a question of common sense; to the chemist it is a problem in chemical affinity. To the ordinary "boss" the following example taken from Mr. F. W. Taylor's experience will appeal only as a common sense thing to do; to the manager looking for

truths by which he may guide his own endeavors there will appear the great problem of the saving of labor power, the inductive principle of investigation and a never-ceasing struggle to attain new standards of efficiency—there being no assumption of finality in the derivation of laws.

Mr. Taylor was looking for the law controlling the efficiency of shoveling. Accordingly, he first selected the type of man who was best adapted to the work. He did not, as he says, take a trotting horse as his standard of animal to find out what a first-class horse should do in hauling coal. So when he wanted to study the science of shoveling he selected two men and spoke as follows:

“You are good shovelers; we want you to work squarely. We are going to ask you to do a lot of fool things, and we are going to pay you double wages while this investigation is going on. It will probably last two or three months. This man will be over you all day long with a stop-watch. He will time you; he will count the shovel-loads and tell you what to do. He does not want you to hurry; just go at your ordinary pace. But if either of you fellows tries to soldier on us, that will be the end of it; we will find you out as sure as you are born, and we will fire you out of this place. All we want is a square day’s work; no soldiering. If you don’t want to take that job, don’t, but if you do we are very glad to pay you double wages while you are doing it.”

These men took the job and did a fair day’s work throughout the period of investigation. Mr. Taylor continues:

“We began by taking the maximum load on the shovel and counting the shovelfuls all day long and weighing the tonnage at the end of the day. I think it was about thirty-eight pounds

to the shovel. We found how much those men could do when they were shoveling at thirty-eight pounds to the shovel on an average and then we got shorter shovels holding about thirty-four pounds, and measured the tonnage per day, and it was greater than when they were using the thirty-eight pound shovel. They shoveled more with the thirty-four pound shovel-loads than with the thirty-eight pound shovel-loads. Again we reduced the load to thirty pounds and they did a still greater tonnage; again to twenty-eight pounds, and another increase; and the load kept on increasing as we diminished the shovel-load until we reached about twenty-one pounds, where the man did his biggest day's work. With twenty pounds, with eighteen pounds, with seventeen, and with fourteen, they did again a smaller day's work. Starting with a thirty-eight pound shovel, they went higher and higher until the biggest day's work was done with a twenty-one pound shovel; but when they got the lighter shovel the load went down as the shovel-load diminished."

The conclusion induced from this long experiment was that the highest efficiency in shoveling depended upon supplying the workingmen with a shovel which would hold twenty-one pounds no matter what the material might be.

18. *Effect of a new standard.*—But a standard established in one department meant a change of conditions in other departments. The principle of the distribution of functions applies as well to departments as to men and upon a correct balancing of them depends the success of a management which would avoid waste through a correct correlation of its productive forces. This principle is well illustrated in the final outcome of the experiments with the shovelers. First the management had to build a shovel-room for the common laborers. Up to this time the men had owned their

own shovels, but now all this was changed, for it was found necessary to equip the "shovel room" with eight or ten different types. One shovel, for instance, would be fitted to rice coal; another would be suited for a very heavy ore, etc., etc., but each would carry just a twenty-one-pound load.

The establishment of a shovel room was a simple thing in itself but it meant organization where before there had been none. A good shovel is of little use unless the right laborer has it at the right place, and in a yard two miles long and half a mile wide and employing 600 men doing all kinds of miscellaneous work the working schedule is no small task. This meant more organization and a redistribution of managerial functions from the foreman's point of view. In place of the old-fashioned foreman who walked around with his men and told them what to do, a large building was erected containing a labor office under the charge of three highly trained men who, with their assistants, planned the work of the shovelers at least one day ahead of the work.

19. *Furnishing the men with a teacher.*—The final element in business management is also illustrated by the methods employed in the above experiment. The teaching element is no new thing in management. It has always been there, but generally it has been so mixed up with other functions that it has been lost sight of in these days of big and complex business operations. Every boss is supposed to be an instructor, but he uses his authority more often than his knowledge of the particular job to keep the laborer to his pace.

In some of the more recent attempts to discover the principles of management the function of instructing has been again emphasized. This is seen also in Mr.

Taylor's experiment with the shovelers. Having provided a physical organization for handling his 600 men or more, he made out a time table showing just how long it took the men to do each kind of work. Then it devolved upon the management to inform the men each day just what they had done the day before and just what they were to do that day. In order to do that

“as each man came in the morning he had to reach his hand up to a pigeonhole (most of the men could not read and write, but they could all find their pigeonholes) and take out two slips of paper. One was a yellow slip and one was a white slip. If they found the yellow slips, those men who could not read and write knew perfectly well what was meant. It was just the general information: ‘Yesterday you did not earn the money that a first-class man ought to earn. We want you to earn at least 60 per cent. beyond what other laborers are paid around Bethlehem. You failed to earn that much yesterday; there is something wrong.’ It was merely a notice to the man that there is something wrong. The other piece of paper told him what implement to use. He went to the tool-room, presented it, received the proper implement and took it down to the part of the yard in which he was to work.”

But the instruction of the men was not left with the simple information that they had “fallen down.” This part of the element of teaching is generally very effectively employed under the “boss” system of management. To show the workman in what respect he had “fallen down” is the real instruction which we refer to in management. As soon as a shoveler was not making as good a record as he should, a teacher was sent out to study the man's method and correct the fault.

“In nine cases out of ten that teacher would find that the man had simply forgotten something about the art of shovel-

ing. Time and again we found that a man had forgotten his instructions and was throwing the weight of his arms instead of the weight of his body upon the shovel."

The teacher would stand by the man as a friend and show him how to earn his premium. Or if, for instance, he found them too light for the work the teacher would recommend that the man be transferred to a job better suited to his strength. Kindly and intimate personal study of the working man is the surest way to find the work best suited for each man. The instructor coördinates the work of the planning room with the work of the laborer and in that way facilitates the flow of productive force in the business organization.

CHAPTER II

MANAGEMENT UNITS

20. *Few principles but many methods.*—The principles of management hold true in every kind and branch of business. It makes no difference whether the business unit is a billion-dollar corporation or a foreman's department where pig iron is handled. But the methods of applying these principles are as varied as the types of businesses themselves. We might say that each business or each department has its own particular method which if found would best fit it. Businesses like people have personal characteristics and no two are exactly alike. If each person were to be dressed in the most appropriate style it would be necessary to put him in the hands of an expert and let the latter study out all the points of harmony so as to dress the customer accordingly. If such were the case, ready-made clothing would disappear and valets and custom tailors would increase. So great, however, has society found the economies of adopting certain units such as hat, coat and trousers, the use of which has been standardized, that a tailor or clothing house which tried to eliminate or seriously modify them would soon go out of business.

Likewise economic society has adopted certain business units for purposes of management. Roughly these units of management correspond to a natural division of the anatomy of business enterprises. The hat is a unit of clothing because the head is an anatomical unit. The

legal corporation and the commercial organization are units of management because the anatomy of a business naturally divides itself into a head for ownership and a body for production. A style of hat which obscured the eyesight would sacrifice efficiency to vanity. A method of corporate management which neglected the stockholders would be sacrificing an ownership function for a selfish reason worse than vanity. Now what we wish to show by this comparison is this: Just as there are many styles of hats so are there many methods of management, and just as the best hat is determined by the fitness to serve the purpose of a hat, so likewise is that method of management best which carries out best the functions of the department which it serves. The basic functions of a hat are protection and adornment; the prime functions of management are control and direction. Methods like styles must conform to the purposes for which they were created.

21. *Economic units.*—We have seen in the chapters on development of organization that the economic unit starting with the family at length grew to include the town and finally embraced the nation. But as nations develop and extend their territorial control, the lines marking out the boundaries of the present economic units become more and more arbitrary and only tend to confuse instead of help clear thinking on economic subjects. This economic fiction is being maintained through the necessities of political policies rather than by the demands of economic science.

The best units in a science of economics are not determined by their size or weight, etc., but by the function which is performed. Thus we find that economic science is divided into the four fundamental branches of production, distribution, exchange and consumption.

Each of these in turn is divided into units which depend for their classification upon the function each performs; thus production is considered from the points of view of the three units of capital, labor and land. Now each of these units is again divided into other units; hence, capital is spoken of as fixed or circulating—depending upon the way it performs its function—and thus we may go on subdividing and resubdividing as long as a single shadow of difference in performance of function remains.

It was by such rigid analysis and classification that economics was reduced to a science of business relations. It is only when these basic units have been determined that true measurement or judgments can be made between the respective demands of labor and capital. We must know the function of each before we can determine the rights of each from the social point of view.

22. *Industrial units.*—Out of the broad field of economics come the industries. Here again we search for the unit of classification based on the function each industry performs and we find manufacturing industries, transportation systems, banking or exchange houses, etc. Each is an industry in that it uses the elements of land, labor and capital to effect different objects. These functions are sufficiently described by the names themselves.

23. *Distinctions between economics, industry and business.*—The object of the two preceding sections is to show how the search for the unit of economic and industrial classification has constituted the main work of the investigations in these fields. Business, in the narrowest interpretation of the word, is made up of activities designed to effect a specific purpose within the field of each industry; manufacturing is a broader term

than plant; transportation than railroading; exchange than banking. Therefore, if we are to get a clear understanding of a business we must discover the basic functions which give character to it or, as we commonly say, determine the nature of an enterprise. This is a somewhat difficult matter in the present stage of confusion of thought concerning economics, industry and business. But briefly the differences are these: Economics treats of land, labor and capital in their relation to human wants. The social point of view is emphasized. In industry these three factors become parts of systems or processes by which society is furnished with economic goods. In business these elements are used for the purpose of producing revenue or dividends.

Thus we see that in economics the point of view is social. In industry it is partly social and partly private. In business the social point of view is completely submerged and that of private interest predominates. These three points of view are clearly seen in the distinguishing phrases of each division. In economics they are utility, value or price; in industry they are mass production, transportation in bulk, or syndicating; in business the great words are corporate control, centralization and money profits.

By keeping these three points of view in mind it is possible to see more clearly the great political and business problems of the nation in so far as they have an economic basis. It will be noticed that the railroad problem, the labor agitation, the tariff question, etc., all lie largely in the field of industrial organization and the chief point at issue is to determine where society's rights begin and private privileges end. Society, for instance, is interested in having the manufacturers of

the nation turn out a maximum of goods. The business man is not anxious primarily as to the quantity of commodities made but to the amount of money received for them.

24. *Managerial or business units.*—From the management point of view, the corporation is a form of specialization which puts the function of ownership and policy control into the hands of a management different from that which directs the productive operations of a business unit. The business unit became so large and complex that it had to be subdivided into smaller units for purposes of management. The corporate organization, therefore, forms one managerial unit made up of stockholders, directors, committees and officers for purposes of directing the financial policy of the business. The other division which has been found necessary to organize into a managerial unit is the operative or production end of the business. This latter has become further specialized into what may be called a staff organization and a line organization.

These management units and their relationship to the general management can best be shown in the form of the diagram on the following page.

An analysis of this chart will disclose that: (1) the corporate unit by exercising its function of ownership has delegated to itself the right of determining what shall be done by the general manager; (2) the staff organization unit has become a necessary part of every large business for the general manager cannot know *how* everything can be done in the best way; (3) the line organization gets its orders directly from the general manager who has been advised by the corporation and staff experts. Although the results of the management issue directly from the line organization yet the

importance of the other units is not to be minimized. The corporate management is controlled by a body of specialists devoting their time to the consideration of financial and commercial policies; and the staff technical experts concentrate their efforts upon the planning of methods by which the purposes of the owners are car-

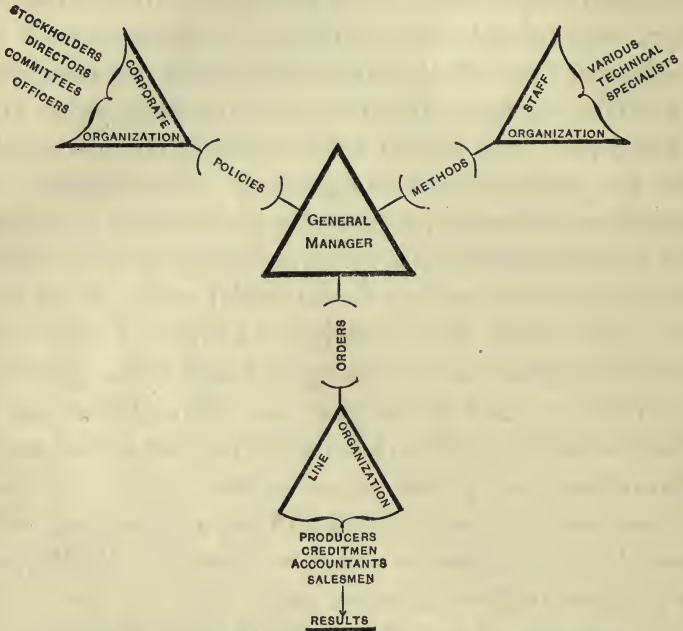


FIGURE 2.—CORPORATE, STAFF AND LINE ORGANIZATION.

ried out through the line organization—the men who obey orders and achieve results.

One important thing which should not be overlooked is the central position occupied by the general manager. It has been sufficiently pointed out how closely specialization must be followed by a more comprehensive organization for the purpose of developing coöperation. With the specialization attendant upon the development of the corporate and operative units of manage-

ment there grew up an overwhelming demand for a coördinating managerial element in the business unit. The general manager is being forced more and more to assume this very heavy responsibility. It is his function to correlate the policies of the corporate advisors with the methods of the technical experts, and then to harmonize both of these with his means of production as found in the line organization.

The details of management are therefore being forced upon three sub-organizations which until very recently have been given little consideration from the point of view of management. As the pressure increases, the necessity of further specialization in each unit increases. Thus we see new points forming through which managerial methods and policies are developed or directed.

Although the corporate organization and its workings are fully treated in a later volume on "Corporation Finance," nevertheless a brief presentment of its organization for management purposes is outlined here.

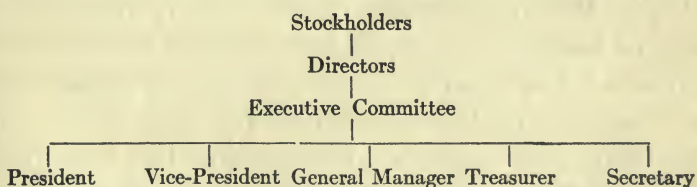


FIGURE 3.—ANALYSIS OF CORPORATE ORGANIZATION.

Corporate management begins with the stockholders who own the business and consequently have initiatory powers. It ends with the executive officer, who like the other officers and committees derives his authority from the board of directors who in turn look to the stockholders. The president or vice-president presides at all meetings of the corporate organization. The

treasurer is custodian of all funds which he disburses on presentation of the proper requisitions. The secretary takes care of all corporate correspondence and keeps the corporate records and the seal. The general manager who is chosen by the executive committee acts as the point of contact between the corporate, staff and line organizations. The corporate officers may or may not be members of the staff or line organizations.

25. *The manager's cabinet.*—The operation of a plant, whether industrial or commercial, calls for exercise of judgment upon many technical matters; accordingly, it has been found necessary to aid the general manager by forming an industrial cabinet made up of experts. For many years the manager who was also a skilled mechanic was able to conduct the operations of production with marked success. This was due to the part which mechanical equipment played in our industrial operations. But at length other factors in the making of goods became prominent. Chemistry became as important as mechanics. Now it is being realized that the organization of the factory, commercial house, or bank, etc., must be given special attention. If the size of any firm's business is commensurate with the average American enterprise, few men would consider themselves capable of exercising the best judgment on all these different specialties. Accordingly, the management has been strengthened by bringing in experts in these various lines.

It may be well to note that the history of industrial development of the various nations shows that the country which has led the world at any particular period has been one which developed first and most efficiently some one of these special activities as aids to the management. England was first in the field with the use of

power machinery. She became the "work shop of the world." America adopted much of the English technique but she leaped to the front industrially largely because of her corporate organization for controlling large capital forces and concentrating them in the exploitation of our natural resources. Recently both the supremacy of England and of the United States has been threatened by the industrial technique of the Germans. They have brought industrial chemistry to their aid in the international strife for commercial supremacy. The field of specialization which is still open for development is organization. Few factories, railroads, or banking institutions have placed among their technical experts a special department for furnishing advice to the general manager on productive efficiency. From the widespread interest that is being displayed at present, however, it does not seem likely that American business men will permit this important function, management, to go undeveloped. The machine, chemistry and corporate organization all reduced costs. The extension of the organization principle to the field of production, transportation, selling, etc., will have a like effect. Many men believe that the addition of an organization expert to the cabinet of the general manager is as imperative as was the creation of a cabinet advisor on agriculture to the president of the United States when the farmers' interests called for special attention.

26. *Analysis of staff and line organization.*—Next to the corporate organization stand the staff and line organizations as units in management. The following chart (Fig. 4) shows various experts and their relation to the general manager; and also how these numerous activities may be further subdivided into smaller units for purposes of more specialized administration.

The various specialists belonging to the staff organization may be permanently or temporarily retained. In either case their position holds such a relationship to the manager that they are not generally considered as employes. The feeling is gradually growing that these men should hold the same relationship to the general manager that a lawyer does to his client. The lawyer looks into the details of each case and reports to the



FIGURE 4.—STAFF AND LINE ORGANIZATION.

client. The latter accepts his lawyer's advice or rejects it as he thinks best. By referring the investigation and solution of the details to competent specialists, the manager is left free to assimilate their plans properly and to correlate the activities growing out of their advice.

When we come to the line experts, the men who are to carry out the orders of the general manager, we are on familiar ground. These departments have been closely connected with the management for many years.

But as the duties of the general manager have grown it has become necessary to depend more and more upon the managers of departments to look after the details. Some confusion has arisen as a result of this dependence upon the departmental managers. The latter in many cases have absorbed the functions of the staff specialists. They have become not only the executors of the work but act as special advisors in the planning of the work. If, however, the functions of these departments are kept clearly before the mind it will be seen that their activities should be confined to carrying out orders given them by the general manager. This division of function may not always be possible or necessary in small plants, but the consideration of management from the point of view of the units for carrying out the functions of management require such a division. It affords not only a clear comprehension of the problems of management but indicates a modern tendency which is striving to relieve the general manager of as many details as possible so that he may be ready to meet every emergency. The details of the administration are, therefore, left in the hands of the manager of production, manager of sales, manager of finance and manager of accounting.

27. *Financial department as a unit.*—The manager of the financial arrangement in connection with the operative departments may have control of the cash, credits and collections. He may also act as inspector of all detailed financial offices. This does not constitute the whole of the financial operations of a business. The financial specialist in large concerns handles such things as the marketing of securities. The position of the financial manager where his functions are fully dif-

ferentiated would appear as in the following chart (Fig. 5):

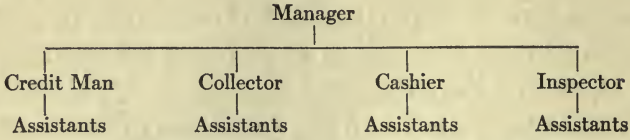


FIG. 5.—ANALYSIS OF FINANCIAL DEPARTMENT.

28. *Sales department as a unit.*—The importance attaching to the marketing of goods has generally been recognized but the peculiar conditions surrounding American markets have, until recently, made the selling of goods a comparatively simple matter. The getting of salesmen with a “good front” or a “personality” seemed to be the chief problem in sales management. To-day this is all changed. It is stated on good authority that 30 per cent of the organization of the merchandising departments of the country under present managements is unnecessary and therefore an added burden of expense. The manager of a sales department must plan his selling campaigns with the thoroughness of a general of an army. To the sales manager are referred all plans for the getting of new business, problems of selling, competition, the making of sales contracts, the reporting of sales data and the inspection of sales agencies.

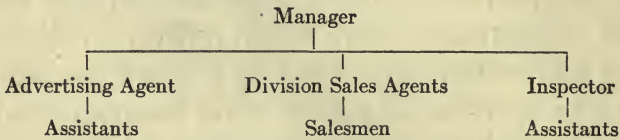


FIGURE 6.—ANALYSIS OF SALES DEPARTMENT.

29. *Accounting department as a unit.*—Here we find a manager in charge of all raw material, worked material and supplies. He likewise has charge of the in-

operative plant and equipment and of all finished product. He also investigates claims, and procures, compiles and distributes all necessary records of conversion and operation. This department is responsible for the inspection of all records.

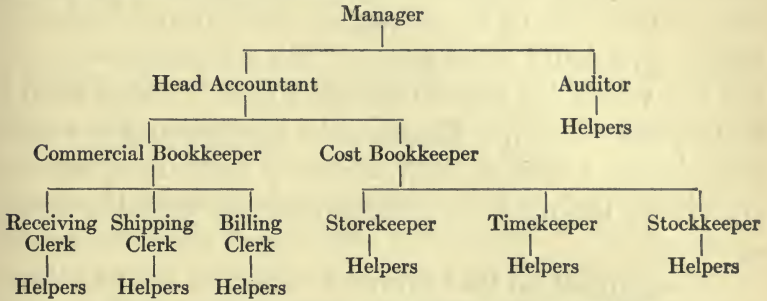


FIGURE 7.—ANALYSIS OF ACCOUNTING DEPARTMENT.

30. *Production department as a unit.*—The classifying of the functions which belong to the production department and the sub-classification into still smaller units has constituted the chief activity of the modern efficiency engineer. According to him a redistribution of these functions is very necessary, but without going into the discussion at present let us see what natural divisions we should find under any system of management. The following chart (Fig. 8) will show that the manager of production should have charge of and jurisdiction over the plant and equipment, the purchase of material, supplies and labor. He will also supervise the inspection of purchases and output.

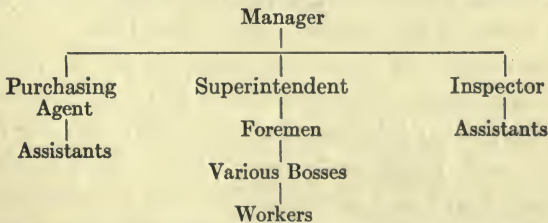


FIG. 8.—ANALYSIS OF PRODUCTION DEPARTMENT.

31. *Management unites the basis of organization charts.*—It has been said that 99 per cent. of the enterprises now in existence have no such thing as a chart or diagram showing the essential units of which their organization is composed. It has been further stated that 50 per cent. of the managers never heard of such a thing. No doubt managers are not generally aware of the aid which the constructing of such a chart would be to them. First, it throws into bold relief the whole organization; second, it shows in a form that can be visualized, the weak or undeveloped parts of the management.

An organization that cannot be charted so as to show the well-defined relationships cannot be said to be scientifically managed. Mr. H. F. J. Porter has said,

Management is like a coaching outfit. The coach must be built right before its service is at its best. All its four wheels must be of the correct size and its body of correct proportions. The horses must be well matched and strong enough to pull the coach. One must not be a dray horse and another a trotter. The harness must be properly suited to the horses so that the collars will not chafe and irritate them and the traces must be of the same length, so as to pull evenly and not permit one horse to get his legs over the other horse's trace and interfere with him. If all of these requirements are not met, there will be danger of not running straight. Merely speaking to the horses kindly, or patting them on the neck, or giving them sugar, or plying the whip, is not going to reach the cause of the trouble. But when this organization is properly arranged so that everything is in its right place, without overlapping or interfering, it is ready for the skilled coachman to get up into the box, take the reins and drive the coach over such roads as he may meet. There is some assurance that it will stay in the middle of the road without any inherent tendency to go over into the ditch on either side.

The man on the box is the manager and upon his general knowledge of conditions and his skill in handling the organization will depend the efficiency of the organization. This man is an entirely different one, however, from the one who designed the coach or the harness, although he should have very much to say about the selection of the horses.

Without going into the details of organization which this analogy suggests it will be sufficient for present purposes to note, that, generally speaking, any organization has four basic departments which may be comparable to the four horses drawing the coach. They are the financial, the sales, the production and the record departments. Each of these should be as independent in its action as any one of the horses, but all should be so thoroughly related by their harness as to constitute a uniform and united force in pulling the business. In other words, these units of management should remain distinct, but their efforts should be so coordinated as to bring about a unified result.

32. *Duties of the management units.*—The duties of the corporate management, as we have seen, are to furnish funds and determine the general commercial policy of the business enterprise. The second group of duties organize themselves into a unit to carry on the productive functions; this in turn divides itself into the staff organization, the chief duty of which is the advising of the general manager upon various technical matters, and the operating unit, which is generally called the line organization.

The operating unit is the one in which we are at present peculiarly interested. This unit, as we found, was divided for purposes of more efficient management into four basic departments. The duty of the first of

these departments is to collect and disburse the money. The duty of the sales department is to obtain orders for work by which the third or production department is kept going. The third department then converts the orders it has received into finished goods. It will be noticed at once how dependent this department is upon the second and the first departments for equipment and then in turn how dependent these departments are upon the production department. If maladjustment is to be avoided, these three departments must be equally balanced and normally independent. This then leads us to the fourth or record department, which is intended to keep accounts of all that happens in the other departments and thus maintain an operative balance. It provides records for the receipt of all raw material, holding it until it is needed by the production department, keeping track of what the latter does with it, taking it back as finished products, handing it over to the sales department and telling the financial department how much it has already cost, how much more it will cost before it is sold, and how much should be added for profit in order that all the departments may be kept in good condition continually.

CHAPTER III

TYPES OF MANAGEMENT

33. *Basis for selecting types.*—It is always helpful to a manager if he is interested in improving his organization to know to what classification his own methods of management belong. It is important, then, that some of the most clearly marked types of management be described.

The basis for determining a type rests largely upon the particular element in an organization which is relatively more important than any of the others. In looking at the problem of management from one point of view, the system employed in keeping track of the men, material, operations, etc., stands out prominently. Accordingly some authorities have divided management into two types, i. e., unsystematized and systematized. Others, again, who wish to emphasize efficiency of operation as contrasted with formal organization or system have added a third type to the above two and have called it scientific or efficiency management. Other authorities would establish still different types. The efficiency engineers have been responsible for the classification of management into military and staff types. This division is based largely on the methods by which the orders of the general manager are carried out and the methods by which he acquires advice and information. A fourth classification is familiar to railroad managers. The peculiar nature of the railroad business

has brought the element of efficient *control* into prominence. Shall the managerial control be centralized, that is, shall the working organization be spread out from a central point so as to cover the entire system, or shall the management be broken up and the responsibilities of operation put upon the local division superintendents, each unit or division being complete in itself? These types are known respectively as departmental and divisional.

Looking at the management from the point of view of the control of the labor element—and many business executives believe that in its last analysis this is the principal question of the manager—management may be divided into three types; undisciplined, disciplined and functional.

34. *Unsystematized type of management.*—The chief characteristic of the management in an unsystematized plant is the lack of a proper system of cost accounts and an inadequate method of keeping the accounting information in good shape. In so far as every management must depend upon its cost and financial records in order to meet market competition, the unsystematized plant is at a distinct disadvantage. Inadequate cost records are the causes of many losses and failures. It is a frequent experience of certified public accountants on being called in to examine books of account to find that the firm is really losing money. Not having kept sufficient cost records, the firm of course has been unconscious of its condition.

When a competitor discovers the fact that his rival is not keeping close account of his costs, he is sometimes able to purchase the goods more cheaply from the firm which keeps inaccurate cost accounts than to make them himself. It is related that a large department store,

which had for years done its own printing, finally ceased this branch of work, because it discovered that the printing trade in general kept very inadequate records of its costs. It then adopted the method of sending for estimates to a large number of printers whenever it had a job which it wished to give out. All of these estimates were to be based upon a printed sample which the store sent to the various printers. The manager was safe in choosing the lowest bid submitted, for without fail some of the bids would be below cost.

Under the unsystematized type of management the accounting generally consists of a statement prepared sometime after the annual or semi-annual stock taking, and shows the profit and loss, and the assets and liabilities. In most cases, however, such a record is chiefly of historical importance. If the statement is bad, it is too late to remedy the troubles of the previous year because it shows merely the result of that year. If, as is likely to happen where there is little system, the yearly statement is delayed, the record becomes too ancient to be of much use. It frequently happens that firms whose fiscal year ends in January do not know the result of their year's business until six months later, and then only in the form of profit and loss and assets and liabilities statements. Some of the information is eighteen months old and it all comes too late to stop any of the leaks.

35. *Majority of industries unsystematized.*—It is probably safe to say that the great majority of the firms of this country belong to the unsystematized type of management. The prevalence of this type of management in America has been due in a great measure to the large margin which has existed between the cost of production and the selling price. Having a large mar-

gin of profit, little attention has been paid to scientific accounting; but conditions in this respect are changing and the number of systematized concerns is growing every day.

36. *Systematized type of management.*—Under the systematized type the managers are methodical and systematic; each department has been studied and systematized until, so far as records go, the firm knows exactly where it stands at all times.

The distinction between the systematized type of management and the unsystematized is seen in the different emphasis which is put upon the accounting. Instead of vague reports made once or twice a year, the books of the systematic type of management show the conditions of the business quarterly or monthly, and in much detail. Four new features usually appear under this form of management. 1. Reports showing last year's costs with this year's costs. These may be made on the basis of a department or of a certain product. 2. There will be costs, showing material and labor value. 3. In addition to the determination of these direct costs there will also appear a practical method whereby overhead charges may be equitably distributed. 4. The results of the business are periodically put before the manager in a simple but comprehensive table or chart.

37. *Cost records highly developed.*—The cost records give systematized management a distinct advantage over the unsystematized firms. Correct cost accounts are relied upon to establish the selling price, and to point out excessive costs and indicate perhaps where they may be reduced. Many managers, therefore, believe that when they have a systematized plant they then have also an efficient plant. It is just at this point that

the exponents of the new scientific management take issue with them. They point out that system helps only one function of management and that even under the best systematized methods many things might be discovered pertaining to the system itself, which would be eliminated under the efficiency or scientific type of management. These critics point out, for example, that the same general system of accounting under the systematized type does not permeate the whole plant. To illustrate, the clerical work in the different departments may not be included in the cost accounting. The close analysis to which the unsystematized type of management has been subjected recently has set a new standard of accomplishment before the management. To attain these results new methods of management based upon close analysis are proposed. As these contrast sharply with the other, a new type has been established.

38. *The efficiency type of management.*—The manager of a business of the unsystematized type depends for information regarding costs and income largely upon his general impression supplemented by an accounting system that also deals more or less in generalities. The systematized type furnishes the controller with comparatively accurate and detailed data as to where, when and how the money was spent and gives the manager a good idea as to how his business is going as compared with other years. But this is only half of the problem. The manager knows how, when and where his money was spent, but he does not know whether or not it was laid out in the best possible way. He only knows that this year's operations were better or worse than those of last year or of the year previous. But why take one year and compare it with another? Does this method disclose the *causes* of the fluc-

tuations of profits? "No," says the efficiency engineer. "The manager should know that for every dime spent a full *standard equivalent* is rendered." It is the setting of standards that differentiates most distinctively the efficiently managed types from the other types. When standard times, standard materials, etc., have been determined, it is then and then only that the cost accounting system brings information that can be used as a basis for operative comparisons.

39. *Standardizing costs.*—When the times, qualities and conditions of working have been standardized, then costs can be obtained which can be considered as a standard for measuring other costs. The amount of money spent upon a standardized operation becomes the common measure for determining the efficiency of these costs at other times and under other conditions. The cost accounting records which show the actual results obtained for each item of money, material or service can thus be compared with the "efficiency records" which show what should be obtained when these items are standardized. Thus the efficiency of the operations for the weekly, monthly or yearly period is determined. The system thus becomes a real aid in gaining bigger results.

40. *Costs come as a by-product.*—Costs come as a by-product of the methods for increasing efficiency. This may be illustrated by following the course of a ticket as used in a plant under the scientifically managed type of organization. A ticket is made up in the central planning department and when used in connection with the instruction card shows how the work is planned before operations upon it begin. This ticket is next employed to control the order of work by being placed on a bulletin or dispatch board. From this the workman gets

his job together with his instructions for carrying it out. The ticket is stamped with the time when he takes it and again stamped at the finishing of the work. Having performed the function of directing the job into the shop the ticket is now used to check off the progress of the work as it passes through the shop. This record is carried on a route sheet. When the job is completed the ticket is sent to the accounting department to be used in making up the workman's wages. This duty performed, the tickets are reassorted for the cost accountant on the basis of specific operations to enable the labor cost of the job to be determined. And finally, where total or departmental costs are wanted, all of these cost-sheets on individual jobs become the basis for the determination of total and experimental expenses and charges. The ticket has thus been made to do its share in the work of production, as well as to stand filed as a record. The system has been made subservient to the real purpose of the organization, the gaining of greater efficiency. This change of emphasis from system to efficiency which the scientifically managed business insists upon making shows a clearly defined result. It is claimed that more economical ways of handling the system itself are found when a systematized plant is subjected to efficiency methods.

41. *Comparisons which afford a deadly parallel.*— All accounting systems base their chief argument for existence on the comparisons which they afford. This is very important. The "deadly parallel" is a method not to be ignored when a manager wishes a short cut to the comprehensions of his subordinates. Systematized management recognizes this spur to increased effort and efficiency. For instance, a well systematized firm employing uniform accounting methods through-

out all its numerous branches employed an accountant to gather the monthly reports of each branch. After a careful study of the items in detail he prepared a comparative table of results of all the branches and sent a copy to each local district agent. If agent A did a \$10,000 business during the month and had \$7,000 on hand in stock he was able to compare in detail his expense items of labor, etc., with the results of agent B who did \$11,000 worth of business but had only \$4,000 tied up in stock. Such comparisons are often enough to induce agent A to find means of releasing the \$3,000 capital which is lying idle. But a system of accounting that is based upon efficiency records furnishes results based on *standard* accomplishments and these serve the manager in place of a series of "deadly parallels" which are mere comparisons of one period of operation with another. Comparisons with predetermined standards stimulate the manager as well as the subordinates. Every deviation of his costs from the standard is clearly revealed.

42. *Stock-taking under scientific methods.*—Another example may show the gains of the efficiency type of management over the others even more clearly. Annual stock-taking is an expensive operation. Frequently it involves shut-downs as well as the usual charges. Under the type known as efficiently managed these expenses are usually eliminated. Here, as in the case of the ticket issued by the planning department mentioned above, the accounting system performs its part in production. The accounting actually controls the movements of materials in and out of the "stores." Hence its records show the amount in stores and if necessary its value equivalent can be computed when desired. It furnishes a continuous inventory, and daily balances can

be obtained where formerly weeks and months elapsed before results were known. Firms taking stock on January 1 sometimes do not know how much stock they had at that date until six or seven months later.

Other examples might be taken to show the difference between the two types of management, but suffice it to say that the efficiency system keeps as close a record of the amount of materials and labor in process and the value of the manufactured goods as it does of the stores.

43. *Staff and military types of management.*—Just what distinction is to be emphasized in this classification is not always made clear. The military organizations of to-day undoubtedly employ staff methods and have developed them to a high degree of efficiency. The contrast which most expounders of these types have in mind when comparing the staff with the military type seems to be the method of exercising control of the business, or the execution of orders and commands. The military type suggests a domineering attitude, an autocratic method and promotion by seniority. The staff implies specialized knowledge, conferences and advancement through proved fitness. The military type is usually described as a one-man power having for its ruler a despot who determines his actions by the standards of inherited information and manages his business through rule-of-thumb methods. The staff type is pictured as being just the reverse of this. Here the manager is supreme in command but he is advised at every step by experts whose information upon their specialties is the very latest that can be found. No snap judgments and no empiricism are in control.

Since there is so much discussion on the subject to-day it may be well to state this case somewhat more at

length than the importance of the distinction calls for. The distinction has grown up largely through the attacks of industrial engineers upon the present system of industrial organization. They found most of the industrial plants of the country poorly managed because one man was trying to do it all. The manager finding his powers limited in time and space put much responsibility upon the superintendents. These in turn forced the work of carrying out orders upon the foremen. The latter becoming overburdened were compelled to rely more and more upon the judgment and initiative of the workingmen. This brought the burden of the work and responsibility upon the very men who were least able to bear it. Non-organization and great waste were the results. Since the manager with his superintendents, foremen, etc., suggested the army organization, the name military was attached to it. But likewise this military form became associated with poor management and extravagant waste in production. Then came the discovery that some concerns had increased their efficiency by hiring expert chemists, draughtsmen, students of labor questions, etc. This at once suggested the staff organization. The idea was then developed so as to put most of the important functions of management under the guidance of a body of specialists. A business, therefore, which had such an addition to its managerial equipment was spoken of as organized on the staff principle.

44. *Army as an analogy.*—So far as military organization is concerned, the army represents both the staff and line principles in their highest form of development, and a brief review of its parts and functions will help the business man to see their application to his own system of management.

Military organization has three main divisions:

The General or Military Staff,

The Administrative Staff,

The Fighting Troops.

45. *Functions of the general staff.*—The general or military staff is expected to supply information and brains. Its work, therefore, divides into two distinct branches, "intelligence" and "operation."¹ "Intelligence" embraces the collecting of information about the enemy and the seat of war, from every possible source, and arranging for its transmission to headquarters, where it is next examined and collated, and finally laid before the commander. This branch also includes everything connected with maps and topographical information, press censorship, and provision for interpreters and guides. "Operation" includes: (a) working out details of the dispositions and movements of troops, their *units* and numbers, giving especial attention to place and time and to the security of the troops in movement and at rest; (b) embodying the commander's plans in clear and concise "Operation Orders"; (c) transmitting these orders with certainty and dispatch; (d) watching and insuring their due execution by the administrative staff.

46. *Organization of military staff.*—The military staff of the commander of a U. S. Field Army consists of: Chief of Staff; Adjutant General; Inspector General; Provost Marshal, who has charge of army police, is chief of the secret service, and oversees the field post office; Chief Signal Officer, who has charge of the military telegraph signal stations and balloons and is general commander of all signal troops of the army; and three aides with the rank of lieutenant-colonel. Of

¹ Herbert Foster, "Organization," p. 58.

course each of these is assisted by one or more subordinates and the necessary clerical force.

There is an essential distinction between the action of Commanders and that of Staff Officers, however capable. It is true that Staff Officers are not merely clerks or messengers. There is often imposed on them the duty of explaining to the immediate executive agents the intentions of their chief, so as to solve ambiguities or remedy misunderstandings, and to create identical views on the situation, especially if it is rapidly changing. But it is outside the scope of the Staff to interfere with the exercise of command, that is, on their own authority, to urge, or approve, or condemn any particular action on the part of subordinate commanders. To do so is to usurp the function of their chief and to form a lateral interference with the direct chain of responsibility. Such action commonly leads to a struggle of conflicting temperaments, contrary to all discipline and tends to produce anarchy in the command.¹

47. *Organization of administrative staff.*—The duty of the administrative staff is to supply each individual in the force with all he requires to make it possible for him not only to live, but to move and fight. If the man is not regularly supplied with food, clothing and ammunition, he will not be in condition to fight.

The administrative staff of an American Field Army² consists of a judge advocate at headquarters who supervises the proceedings of court martial, military commissions, courts of inquiry, etc.; a commissary of musters charged with making all musters into and out of military service, and who exercises general supervision over all musters and payrolls; a chief ordnance officer, charged with the supply of ammunition, arms, artillery, carriages and equipment for the troops of the

¹ H. O. Arnold-Forster, "The War Office, the Army and the Empire," page 246.

² Arthur L. Wagner, "Organization and Tactics," page 32.

three armies; a chief quartermaster, responsible for providing the army with forage, transportation, clothing, camp and garrison equipage, and for the management of trains; a chief commissary of subsistence, charged with providing food for the army; a chief surgeon, charged with the hospital and ambulance service.

48. *Succession by seniority.*—The careful adaptation of the means to the end has developed the chain of command in the line organization and succession by seniority. The art of war is to concentrate the largest possible force at the right moment at the decisive point. The chain of command makes every group, from a single soldier to a complete army, an independent unit and this without any conflict of authority. This allows the changing of the organization to meet the varying conditions of the campaign without weakening the unity of the whole at any time. All great authorities on army organization emphasize the importance of having each formation composed of not less than three subordinate units so that no duplication of command can result if one of the units is dispatched on special duty. In order to insure permanency to the organization, under the trying conditions of war and to prevent the carnage which results from confusion during a battle, it is absolutely necessary that the next in command succeed automatically to the vacancy caused by a casualty. Hence the lieutenant becomes captain when the captain falls.

49. *War develops organization.*—For our purposes it is not necessary to outline the organization of the fighting troops. The business man can glean many a good suggestion if this outline of the army organization is carefully studied, for many striking comparisons between it and our industrial and business methods will

be observed. The necessities of war have developed every organ in the military body to its highest degree of effectiveness. When business executives come to see that their organizations must likewise be developed if they are to meet competition, both domestic and foreign, then they too will study their management problems from the point of view of function, rather than try to solve them by rule of thumb.

50. *Staff and line in business.*—One firm which uses the distinction between staff and line officers is the Sherwin-Williams Paint Company in the selling department. The main office experts, such as “Chief of Motor Power” or “Varnish Sales Department Manager,” confine their attention to working out the best methods and the adoption of the standards without having executive control. This rests in the line or territorial managers. The company holds that the technical man is doing his best work when he is showing another man how to do it. The specialist is needed in the period when construction and installation is taking place. The salesmen in the field should be instructed so that they may meet ordinary business contingencies.

51. *Divisional and departmental types.*—The basis for this classification rests upon considerations different from those upon which the classifications already mentioned were made. These terms are more familiar to railroad men than to managers in other lines of business. The principle, however, on which this division is made is just as applicable to other forms of business organization as it is to railroading. But since the description of the conditions as they exist in the railroad business will best bring out the principles underlying these two types of management, this form of enterprise has been chosen.

One of the great problems of railroad management is to overcome the difficulties imposed upon it by the great distances which separate the operating department from the source of control. To look after the details of operation of any railroad four or five thousand miles long would be beyond the capacity of any general manager. Accordingly, the operating territory has been divided into districts and its management put in the hands of subordinates. The division may be long or short, depending on circumstances. For example, the Pennsylvania Railroad station in Philadelphia forms one division, but the average length of the divisions of this same line east of Pittsburgh, outside of the big cities, is 150 miles. To manage the details extending over a territory so large as this considerable authority must be vested in some local authority. The divisional superintendent under this type is, therefore, a man of considerable importance. As Mr. Ray Morris in his excellent book on "Railroad Administration" says:

In the pure divisional organization this executive officer, the division superintendent, is made a little king over his small domain. He does not solicit traffic nor does he collect or disburse funds, nor is he a lawyer nor primarily an engineer, but everybody actually employed on the division reports to him on questions of current operation. In the strict divisional organization nobody can question the orders which the division superintendent issues to the gangs actually at work, or to train crews, or to station agents; in case of personal injustice they have some right of appeal afterward if they want it, but they must first do what they are told.

52. *Characteristics of the departmental type.*—Although the divisional type of management is predomi-

nant in America, nevertheless, there are some conspicuous examples of the introduction of the departmental type. The word "department" has a somewhat different significance in the railroad man's parlance from what it has in the language of the industrial manager. When the railroad manager speaks of departments he has in mind the functional operations which are performed on any piece of work. The industrial manager, on the other hand, generally thinks of the department as a room in which certain operations take place. The department in a store or factory thus corresponds to the division on the railroad and hence the character of the difficulties which arise under the control of the divisional superintendent are much the same in a general way as those which develop under a general manager in an industrial or commercial establishment. No matter how capable a man the superintendent may be, he cannot be an expert in several directions. If he is a good operating man he is likely to be weak as a civil engineer and as a mechanical engineer. Under the departmental type of management, therefore, the good operating superintendent confines his work to his specialty, i. e., to the operation of the trains, and is supplied with experts in mechanical and civil engineering. Under the departmental type the divisional superintendent does not have absolute control over all activities. For example, if two engines are to be repaired and the division superintendent wishes it done at once, he must first take up the question with the superintendent of motive power who is an expert in such matters. The latter officer, however, not being connected with the local division staff, after having considered the advisability of the repairs, would then refer the matter to the master mechanic who is located in the division

superintendent's territory. In brief, quoting again from Mr. Morris:

The departmental point of view is that it is economy to have and to use the best in all branches of the service, and that if the mechanical forces do all their work under the supervision of a \$10,000 superintendent of motive power, the results will be better than if they do half of it under the supervision of the \$2,500 superintendent.

The following chart (Fig. 9) will illustrate the line of authority as it is displayed in the two types of management.

53. *Comparison of the two organizations.*—The following excerpt from an address by Mr. Arthur Hale before the New York University students brings out the workings of the departmental system when applied to large railroads:

No matter what the type of business a man may be engaged in he can readily see the application if he simply substitutes the names of the departments in his own particular industry and the officers who have them in charge for those referred to under railroad management. Every approach to the departmental system on a one-division railroad weakens the superintendent without strengthening the president, and for the larger system every approach to the departmental system weakens the superintendent without strengthening the general manager.

Strength and weakness are best shown in emergencies, and an actual emergency will best show how division and department organization work. On a certain occasion it became necessary to rebuild certain trestles near each other on parallel railroads organized differently. The superintendent of the railroad with the division organization got his carpenters together at once, bridge carpenters, and shop carpenters and

all, and transported them by special train to the scene of the accident, with all the heavy timber he could get together, and

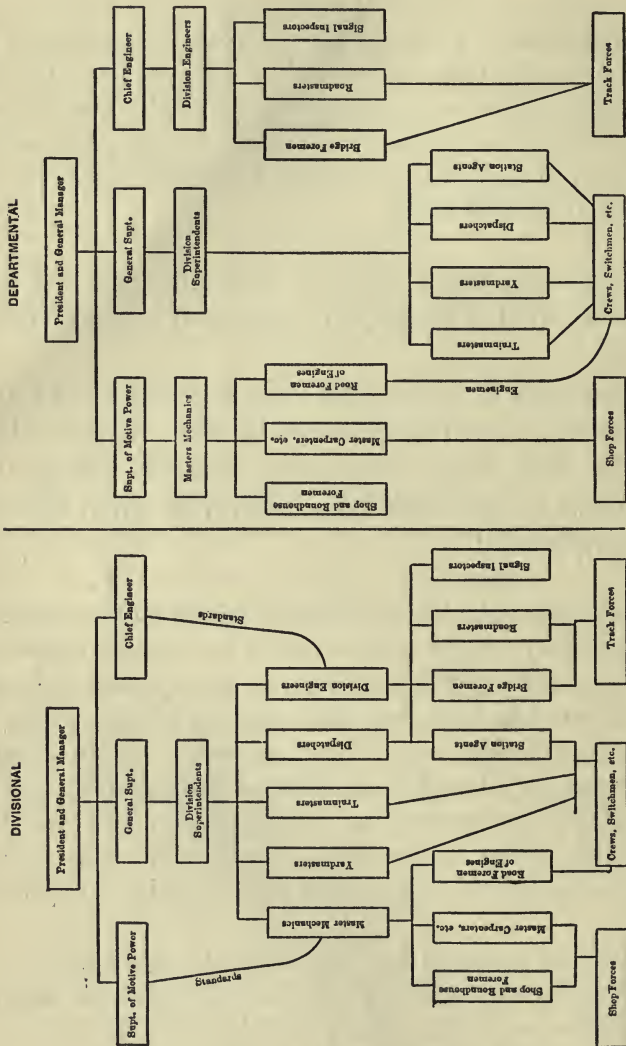


FIGURE 9.—RAILROAD OPERATING ORGANIZATIONS IN THEIR SIMPLEST FORM¹
¹ Copied by permission from "Railroad Administration," by Ray Morris, p. 78 (Appleton).

simply reported what he had done. The superintendent of the road with the departmental organization could do nothing but report the facts to his general manager. The superintendent

had no control of the bridge carpenters or the shop carpenters in his vicinity. It was Sunday, and, to tell the truth, he did not know where they were to be found. The general manager was not in much better plight, but he managed to organize a force composed of his general superintendent, his superintendent of floating equipment, and his engineer of bridges, and he made very good time with his trestle. It would have been better on a week day, but the organization went to pieces on Sunday.

Or, take a more usual case, the investigation of an accident. A car goes off the track; is the trouble with the car, the tracks or the speed? We must know, for it must not occur again. With the division organization such a question goes to the superintendent. He represents the three departments; he knows the territory and will decide the case in short order. Indeed, the mere fact that he will so decide frequently prevents his department from urging doubtful claims. With the department organization there is no impartial authority on the ground, and many investigations are closed without decision. Of course they can be carried to the general manager, but he cannot decide all such questions, more especially as his chiefs of departments are quite likely to stand up for their own men.

From the side of economy and efficiency the division organization also has advantages. When a superintendent can be held responsible for everything on his division he will see that he has enough men, and no more, to keep his engines and tracks in condition. Under the department system all the work will be authorized and done on orders from headquarters without so intimate a knowledge of local needs.

Of course, the division system has difficulties. The rivalry is here among divisions instead of among departments. This means that a firm hand is needed at headquarters to keep the rivalry healthy. The objection most often urged, however, is that certain officers on the staff of the superintendent will have a divided responsibility. The division engineer, for instance, must be responsible to the superintendent in certain matters and to the chief engineer in others. The master

mechanic must also serve two masters, the division superintendent and the superintendent of motive power. And the subject is dismissed with the dictum, "a divided responsibility will never do."

The gentlemen who take this ground forget that our whole railroad system is based on divided responsibility. The agent reports to four departments, so may the conductor, while the enginemen and the firemen and car inspectors report to two. If the firemen can safely report to both the trainmaster and the road foreman, cannot two of his superiors be trusted to do the same thing?

The only reason that it is safe for the firemen and the enginemen to report to two superiors is that this responsibility is carefully defined in the books of rules, and that the men have been carefully disciplined in the matter. There is no greater difficulty in defining the two responsibilities of division engineer and the master mechanic.

It is obvious that these officers should report to the superintendent in matters of policy, discipline and expense. To the chief engineer and superintendent of motive power they should report on all technical matters. But perhaps the best way to phrase this is to say that they should report to the division superintendent everything excepting matters relating to standard designs and methods. It has always been recognized that standard designs come under the members of the general manager's staff. Where there has been difficulty, it can be traced to misunderstanding as to methods of doing work, and the recognition of standard methods should give the staff officers sufficient power as well as plenty to do, for these independent superintendents are sometimes hard to handle. The department type will make you splendid trainmasters and most accomplished engineers in the civil and mechanical branches. The divisional type will give you all around railroad men.

54. *Advantages and disadvantages of the two types.*
—In order that the advantages and disadvantages of

these two types may be closely compared the following outline is given:

DEPARTMENTAL

ADVANTAGES

1. Develops specialists.
2. Expert in charge of each department.
3. Avoids duplication, and so tends to increase the machinery floor space, and power available for a given volume of work.
4. Uniformity of method.

DISADVANTAGES

1. Danger that the heads will work for the departmental showing even at the expense of some other departments. If by spending \$3 or \$4 a department head can save \$10 in some other department, it is to the company's interest to do so even though his department expenses are thereby increased.

DIVISIONAL

ADVANTAGES

1. Develops all-round men.
2. Centralizes control, hence promotes unity of purpose.
3. Promotes closer coöperation, especially in times of emergency, between departments, since all are under one man's charge.
4. Hence quicker production, and
5. Decreased clerical labor.
6. Increases individual initiative and competition between similar units.

DISADVANTAGES

1. Directing head is not a technical expert in each field.

Which system is the better is for each business to decide for itself. Adaptability to changed conditions is largely a matter of temperament. On important questions there are usually two schools of opinions. The general sentiment seems to be that the departmental is preferable in small companies. Here control is comparatively simple and the departmental arrangement makes the most efficient use of the available talent.

Similarly where the technical feature is more important than the executive the departmental arrangement is preferable because it places a technical expert in charge of each department. Where, however, the company is large in numbers or covers a big territory or deals with isolated units, such as battleships, separate contractors or plants, the tendency is toward divisional organization. Within the last few years the railroads have extended its application, the navy has consolidated the engineering and line officers on its battleships, and the Westinghouse Electric and Manufacturing Company, after a careful study of existing methods and extensive experimentation, has changed from the departmental to the divisional and is more than pleased with results. While under the divisional system each department may not be administered so efficiently as by a specialist, this loss is made up through the saving resulting from the closer cooperation between the departments.

55. *Compromises in practice.*—As an actual fact, most organizations cannot be classed as being either clearly departmental or divisional but are a mixture of the two. They attempt in various ways to secure the increased control of the unit system without sacrificing the expert council of the functional. This is sometimes brought about by dividing authority as in the Pennsylvania Railroad. The master mechanic is accountable to both superintendent of motive power and division superintendent. Thompson-Starret's timekeepers are accountable to the job superintendent and to the head timekeeper. When the scope of the several authorities is clearly defined in the rule book and the administration is carried on with courtesy and good sense, the demands of ordinary business are met and this is probably the best solution.

CHAPTER IV

TYPES OF MANAGEMENT (*continued*)

56. *Undisciplined and disciplined management.*—Reference has been made already to the various points of view from which the problems of management may be observed. From an accountant's or a systematizer's point of view, it is either unsystematized or systematized; from the executive's point of view, his organization is controlled either by staff or military methods; if he happens to be a railroad manager, he may speak of his control being exercised either under the divisional or departmental type of management.

We may make a further classification into two classes; namely, undisciplined and disciplined management. The point of view here taken is that the labor condition in a plant depends upon the nature of its management. These conditions will enable the laborer to use his time effectively or otherwise.

57. *Undisciplined type.*—A close study of the average workingman's day will show that a surprisingly small proportion of the time is given to effective work. The small proportion of effective time is the chief characteristic of the undisciplined type of management. It could not be otherwise in a plant where orders are transmitted verbally from one source of authority to another. Many of these firms permit their salesmen to give their orders directly to the superintendent; the latter, without further instructions, transmits his order to the foreman, adding, perhaps, a few details which

the latter may need for his enlightenment. It is assumed that the superintendent knows his business and that the foremen know theirs and that finally when the laborer receives his orders, he will know what is wanted or will ask questions when he is not sure. A working force trying to get started upon a job on such inexact information must necessarily lose much time.

But the loss does not end here. When the superintendent, the foremen and the workmen have all studied out the best way to do the work, the preparation for and the execution of the work must still be done in the same haphazard manner. The number of men and the amount of work each foreman is expected to control is only limited by the amount of details which he can carry in his head. The more this detail increases the more must he depend upon the men working under him. When questions arise in the progress of the work, which happens continually where there are no written orders or instructions for the workingman, all progress on the work stops until the foreman can go to the superintendent, and the latter to the office to find out what is to be done. Furthermore, in such a business, there are no provisions whereby the workingman is supplied with tools and appliances. He must hunt out and select his own equipment. When the pay roll is examined, the same lack of control is found here. If the piece-work method of payment is used, it will generally be found to be unequal. Rates, not being determined by any exact method, are often subject to change and with every change some discipline is lost.

This lack of control on the part of the management by not planning the work at the start and by not issuing direct instructions results in little or no coöperation among departments and hence a congestion of unfin-

ished work at many points. Thousands of dollars of capital are thus tied up in many plants and valuable floor space which might be used to better advantage is taken up with unfinished goods, the interest charges on which are every moment eating into the profits.

It would be impossible to name all the evidences of waste which show themselves under the undisciplined type of management, but three stand out prominently. As might be inferred, it is difficult to secure a high quality of work and to maintain a uniform quality. Furthermore, the numerous mistakes which are likely to occur in rush times are not always called to the attention of the managers. Finally, if the cost records of the concern were to be examined, it would be found that the costs fluctuate much more than they should.

58. *Low labor efficiency.*—During dull periods the ineffectiveness of the undisciplined type shows itself most clearly. The output of the plant on the whole is low and uneven; even among the departments there is an easily traced variation. All this is due to the lack of efficient control. It is the opinion of the foreman and not an exact standard which determines the output of a machine or of a man. And although some departments may be working efficiently, the accomplishments of others are very low. Therefore, while the majority of the men may be doing what they consider a fair day's work, the ratio of the productive time to the time which is lost is very low.

One example will illustrate the loss of efficiency due to a lack of control under the undisciplined type of management. In this case, the internal control was interfered with by outside factors. A workingman in a certain trade was able to make \$3 a day, but he was limited to \$2 per day by "shop opinion." It cost the firm much

more by this method because the floor space occupied could have turned out 50 per cent. more work if the manager could have selected his man and encouraged him to work up to a higher standard. In addition, since the man's case was typical, the overhead charges must be considered, for it was necessary to spread at least 50 per cent. more of the cost over each unit of the product than was necessary.

Perhaps the greatest loss is in the effect that such a method has upon the workingman himself. If he is well adapted to the work, he will be much happier where he is permitted to do his best.

59. *Disciplined type of management.*—Under this type of management the mistakes of the undisciplined type are avoided. The managers are systematic and methodical. The slipshod methods of the first kind of management are displaced by a complete set of order cards directing the laborer by recording and transmitting the orders. Even though he is not told *how* to do it, he is at least instructed *what* to do. Each worker is supplied with a time card upon which he is to record the time for each job and although this does not show the time taken getting ready to begin work, etc., nevertheless, it does record accurately the direct labor cost.

60. *Evidences of discipline.*—Most disciplined types try to install uniform systems of wage payment. As a rule, piece work is considered the most economical way of doing the work. In short, instances of the disciplined management show that such systems are remarkably free from errors and bad work and often reach the maximum output per man and per machine under the conditions. Yet the standards for the output are seldom any better than under the undisciplined type; for here, as in the former, the opinions of the bosses and

foremen serve as the standards of accomplishment. Standards obtained by trained men and exact methods are lacking, and little effort is made to study the workers to find out whether or not they are fitted for their particular tasks, or doing their work in the best possible way.

Mr. Henry P. Kendall, manager of the Plimpton Press, gives an interesting illustration of the necessity for supplementing disciplined management by closer study.

In book-binding there are different kinds of work. Laying gold leaf calls for a girl with small fingers and a delicate touch. Strength is not required. Another operation calls for a large, strong girl, who can easily handle bundles of work weighing seven or eight pounds. In proof-reading the time reaction of seeing a word and grasping its meaning is a very important feature. Other girls doing inspection work must have the ability to concentrate their minds on one particular operation. The different kinds of work demand girls selected with special reference to their aptitude for their particular work. In every factory will be found workers in one department who cannot successfully do their work, but who could successfully do work of another kind.

When I think over the psychology of industrial workers, I am reminded of my own experience in college. In the psychological laboratory tests were made on all my class. I had the quickest time reaction from seeing a flash of light to muscular action in pressing a button; I had the slowest time reaction in the class in seeing a word, comprehending its meaning, and then pressing a button which registered the time it had taken me to see and comprehend its meaning. This experiment showed the reason why I was the slowest reader in my class and why on a given test in reading, in literature or any other subject, I took longer than anyone else. While not a sprinter, my record for the fifteen-yard dash has never

been beaten—not because I was a fast runner, but simply because the time reaction to muscular effort enabled me to get off more quickly after the pistol shot than anyone else. I never could have made a proof-reader or earned my salt as a book-keeper, but I think I should have made a tolerably good motorman.

There is much system and much method in the disciplined type of management but the scientific selection of the worker is almost unknown. Primarily for this reason the highest efficiency is almost impossible of attainment.

61. *Traditional, transitory and functional types.*—No attempt has been made to explain the causes of the differences which exist among the various groups of management. These groups or types have grown up because business men have looked upon the business field from different points of view. When analyzed it will be found that the military type of the second classification corresponds roughly to the undisciplined type of the last classification. Similarly it will be found that a concern which uses the systematized type of management is very likely to fall under the disciplined plan of labor control. Before the recent discussions on the subject of business efficiency became so general, there were three classifications covering the various types of management and they seem to cover the whole field in a much broader way than the more recent classifications. These types were the traditional type, the transitory type and the functional type of management.

It will not be necessary to discuss the first two of these types because they cover in a general way the types already described. The old boss, military or strenuous types of management would fall under the traditional plan. When this plan has been improved

upon, by the adoption of more systematized disciplined methods, the type is spoken of as transitory. However, there is a third type which lies in direct contrast to all of the previous types. In describing it, therefore, it will be necessary to put it in contrast with examples of management under each of the foregoing types.

TRADITIONAL TYPE	TRANSITORY TYPE	FUNCTIONAL TYPE
1. Does not realize that proper space for storage is important.	1. An equipment properly arranged for storage.	1. Physical appearance resembles Transitory Type.
2. May be general store-room, but all the stores seldom found there.	2 (a). Various departments often have their own stores but not under central control. (b). Everything arranged in neat and orderly manner.	2 (a). Central control of department stores. (b). Proper system laid out in orderly way.
3. No system in piling stores. Generally put in place most convenient at the time.	3. Everything is kept in its place.	3. Provision for holding and piling stores.
4. No person to assume and carry out responsibilities for the order in which stores are kept.	4 (a). Storekeeper issues all stock, but no central office control. (b). Stores issued on requisition only. (c). Storekeeper has assistants for moving stores in and out.	4 (a). Balance-of-stores clerk controls all materials from central office. (b). Materials delivered on requisition only when signed by stores clerk in central office. (c). Storekeeper has assistants. All act on orders from central office.
5. Proper records of stores generally missing.	5 (a). Perpetual or "book" inventory kept in office but seldom predetermined maximum and minimum requirements. (b). Office Book inventory is balanced with stores and once a year the balance checked against an actual physical inventory of stores.	5 (a). Ledger sheets in central planning office have maximum and minimum requirements for each kind of material. (b). Balance-of-stores sheets (ledger sheets) kept in the central office. Upon these the location of material is shown. (c). All bookkeeping for stores done in central office.
	6. Some kind of division and classification of stores will be found.	6. Symbols used to designate different kinds of stores.
	7 (a). Sometimes a central planning station is found. (b). In the station the operations for each process are written out before work is started. (c). Where planning station is not in operation, materials are often wanted before it is discovered that some part or material is missing.	7 (a). All work on materials planned ahead in planning department. (b). All planning done before operating department needs them. (c). Materials running low noticed at once and a supply obtained before operations begin.
	8. Supply stores, such as belting, electrical appliances, etc., are not usually put under the general system of stores.	8. System covers all supply stores.
		9. Special men, called "move men," take and remove materials to and from machines, thus relieving workman and keeping him from looking for or waiting for his materials.
		10. Fire Protection.

62. *Functional type of management.*—This type is variously spoken of as scientific, efficient or functional management. Let us now examine somewhat in detail, but in the form of an outline, the various contrasts which appear among the traditional, transitory and functional types when applied to the management of the stores department. The differences which arise here will be typical of the differences which occur in other branches of the business.

63. *Work planned ahead.*—Perhaps the broadest contrast between the functional type and other types is in planning all the work for each workman ahead of time. The principle by which it gains control of the operating elements is by planning completely the proper execution of the work before a single move is made. A route sheet showing the names and order of all the operations which are to be performed is made out and instruction cards are clearly written for each operation period. Requisitions on the stores department showing the kind and quality of the materials and where they should be moved, and the list of proper tools for doing the work in the best way, are prepared for each operation; the very best methods for performing each operation are determined in advance and embodied in the instructions.

64. *Planning gives control.*—Mr. Henry P. Kendall, before the Dartmouth conference on scientific management, said:

By this means, the order and assignment of all work, or routing as it is called, should be conducted by the central planning or routing department. This brings the control of all operations in the plant, the progress and order of the work, back to the central point. Information which even in

the systematized plant is supposed to be furnished by the progress of the workmen or the gang boss or foreman is brought back to the planning room and becomes a part of the instruction card.

In many unsystematized plants no attempt is made to change the methods by which the workman performs his operations. Plenty of time and money may be spent on special machinery, but when that is installed very little time is spent in a close analytical study of the time element and motions involved in the operating, in order to make it possible for the workman to work in the easiest and best way and to furnish a fair basis of remuneration.

When the analytical study has been made, the probable time of operation determined, and a sufficient incentive has been added in the shape of a bonus for performing the work in the time given and in the way specified, then work can be much more accurately controlled from the central planning room because it is likely to be done in approximately the time determined and without lagging.

The execution of work which is largely repetition, where the individual processes are simple, reaches a very high efficiency in many systematized plants. The difficulties in securing efficiency increase as the work becomes more various with a lesser proportion of repeat-work; and in proportion as these difficulties increase, ordinary systems fail to produce results in more intricate work. This can be obtained, however, by the central planning room from the analysis and time study which is put into all operations of work and reduced instruction cards.

65. *Labor efficiency under functional management.*

—In reading the literature of only a few years ago one is struck by the emphasis which is put upon piece-work as a means for reaching the highest efficiency and lowering costs to the minimum. But finally it dawned upon some progressive managers that this system put all the

responsibility upon the workman. Also it was found that there were many kinds of work which were not adapted to the piece-work system; and even where the system was fitted to the work the methods of fixing the rates were generally unscientific. To grade a workman's wages, the means by which he lives, from the snap judgment of some foreman or an imperfect test of some single workman, was not considered just. Accordingly, the principles of scientific management have been applied to the problem of increasing the efficiency of the working man.

The efficiency of the worker under functional management depends on five conditions: (1) The analysis of the elements of an operation; (2) careful selection of the worker; (3) the proper training of the employes; (4) proper tools and equipment; (5) an incentive to work. The first condition which every exponent of the principles of functional management demands is that the manager shall analyze carefully and thoroughly every operation into its ultimate elements. When this has been done the elements shall then be rearranged in their proper sequence. In order that the working man may not fall back into bad habits and thus into many useless and even harmful operations, written instructions are given to him to follow. This will include not only the proper sequence, but the time elements which have been determined. Mr. Gilbreth, the efficiency engineer, it will be remembered, by a simple analysis and synthesis which he calls motion study, eliminated sixteen unnecessary motions from the operation of brick-laying.

66. *How scientific selection aids discipline.*—The second condition, that of the scientific selection of the worker, is fulfilled after a careful analysis of the dif-

ferent mental characteristics necessary to carry on a given line of work. Dr. Katherine Blackford, in a paper entitled "The Scientific Selection of Men in Building up an Organization," mentions a firm where the average sales of the salesmen ranged from \$16,000 a year to \$200,000 a year and she pertinently remarks that by scientifically selecting their men this great discrepancy might be reduced.

Although much of this work falls within the field of the psychologist, nevertheless there are certain broad types of men which can be easily recognized by any manager. Generally speaking, there are certain types which are speculative and optimistic in their disposition. These men are inventive and like to create the ideas or plans which someone else is to work out. They naturally incline to aggressive forms of work, such as salesmanship, advertising and promotion. On the other hand, there is the conservative type, the man who is serious minded and rather unsocial. As a rule, this type prefers to work out and perfect a plan which other minds have conceived. But a scientific selection of the workers is practical only after a scientific analysis of the operations has been made.

67. *How training helps discipline.*—The third condition for getting the highest efficiency under the functional plan demands that the worker shall be trained. This method, therefore, provides for a functional foreman whose duty it is to train the workmen and help them on each job. The manager under this system does not assume that the workingman knows anything about the work. The foreman is held responsible for seeing that the work is done correctly and if it is not, it is his duty to find out why the workingman fails and then help him do it as it should be done according to instructions.

68. *Proper tools must be furnished.*—The fourth condition demands that the management shall supply the worker with the proper tools and equipment as and when needed for each operation. And furthermore it is the management's duty to see that the machines are maintained in first-class condition so that all belt and tool failures be reduced to the minimum.

69. *Best discipline gained by proper incentive.*—The fifth condition makes it necessary for the management to supply the workingman with the proper incentive. It is not enough, however, for the management to show the worker that it is to his financial interest to be industrious, but the management must do everything in its power to make it possible for the worker to increase his earnings by increased industry. Various tests and bonus systems of payment have failed because the manager neglected this important incentive. Under the functional system, however, the man who does not receive his materials promptly and on time, or whose machine is not in good condition, all of which brings about many delays, does not hesitate to complain to the gang boss at once. The latter is just as much interested as the working man is in the latter's receiving his bonus, for if the laborer does not get his increased pay, the gang boss may lose his. Thus the spirit of cooperation is induced, whereby both these men make it their duty to see that the management's policy is promoted.

70. *Taylor's description of functional management.*—It may be well at this point to see how the originator of the system of functional management looks upon it. This plan, in the judgment of Mr. Taylor, can be best introduced by abandoning the military type of organization and establishing two broad and sweeping changes in the art of management.

(1) As far as possible the workman, as well as the gang bosses and foremen, should be entirely relieved of the work of planning and all work which is more or less clerical in its nature. All possible brain work should be removed from the shop and centered in the planning or laying-out department, leaving for the foremen and gang bosses work strictly executive in its nature; their duties being to see that the operations planned and directed from the planning room are promptly carried out in the shop. Their time should be spent with the men, teaching them to think ahead, and leading and instructing them in their work.

(2) Throughout the whole field of management the military type of organization should be abandoned, and what may be called the functional type substituted in its place.

Functional management consists in so dividing the management that each man from the assistant superintendent down shall have as few functions as possible to perform. If practicable the work of each man should be confined to the performance of a single leading function. Under the ordinary or military type the workmen are divided into groups. The men in each group receive their orders from one man only, the foreman or gang boss of the group. This man is the single agent through which the various functions of the management are brought into contact with the men. Certainly the most marked outward characteristic of "Functional Management" lies in the fact that each workman, instead of coming in direct contact with the management at one point only, namely, through his gang boss, receives his daily orders and help directly from eight different bosses, each of whom performs his own particular function. Four of these bosses are in the planning room, and of these three send their orders to and receive their returns from the men, usually in writing. Four others are in the shop and personally help the men in their work, each boss helping in his own particular line or function only. Some of these bosses come in contact with these men only once or twice a day and then for a few minutes perhaps, while others are with the men all the time, and help each man

frequently. The functions of one or two of these bosses require them to come in contact with each workman for so short a time each day that they can perform their particular duties perhaps for all of the men in the shop; while other bosses are called upon to help their men so much and so often that each boss can perform his function but for a few men, and in this particular line a number of bosses are required, all performing the same function but each having his particular group of men to help. Thus the grouping of the men in the shop is entirely changed, each workman belonging to eight different groups according to the particular functional boss whom he happens to be working under at the time.

The following is a brief description of the duties of the four types of executive functional bosses which the writer has found it profitable to use in the active work of the shop: "gang bosses," "speed bosses," "inspector," and "repair bosses."

The "gang boss" has charge of the preparation of all work up to the time that the piece is set in the machine. It is his duty to see that every man under him has at all times at least one piece of work at his machine, with all the jigs, templets, drawings, driving mechanism, sling chains, etc., ready to go into his machine as soon as the piece he is actually working on is done. The "gang boss" must show his men how to set their work in the machines in the quickest time, and see that they do it. He is responsible for the work being accurately and quickly set, and should not only be able but willing to pitch in himself and show the men how to set the work in record time.

The "speed boss" must see that the proper cutting tools are used for each piece of work, that the work is properly driven, that the cuts are started in the right part of the piece, and that the best speed and feeds and depth of cuts are used. His work begins only after the piece is in the lathe or planer, but he must see that they do it in the quickest time, and that they use the speeds and feeds and depth of cut as directed on

the instruction card. In many cases he is called upon to demonstrate that the work can be done in the specified time by doing it himself in the presence of his men.

The "inspector" is responsible for the quality of the work, and both the workmen and speed bosses must see that the work is all finished to suit him. This man can, of course, do his work best if he is a master of the art of finishing work both well and quickly.

The "repair boss" sees that each workman keeps his machine clean, free from dust and scratches, and that he oils and treats it properly, and that all the standards established for the care and maintenance of the machines and their accessories are rigidly maintained, such as care of belts and shifters, cleanliness of floor around machines, and orderly piling and disposition of work.

The following is an outline of the duties of the four functional bosses who are a part of the planning department, and who, in their various functions, represent this department in its connection with the men. The first three of these send their directions to and receive their returns from the men, mainly in writing. These four representatives of the planning room are, the "order-of-work clerk," "instruction-card man," "time-and-cost clerk," and "shop disciplinarian."

Order-of-work or route clerk. After the proper man in the planning department has laid out the exact route which each piece of work is to travel through the shop from machine to machine in order that it may be finished at the time it is needed for assembling, and the work done in the most economical way, the "route clerk" daily writes lists instructing the workmen and also all of the executive shop bosses as to the exact order in which the work is to be done by each class of machines or men, and these lists constitute the chief means for directing the workmen in this particular function.

Instruction-card man. The "instruction card," as its name indicates, is the chief means employed by the planning department in instructing both the executive bosses and the men in

all the details of the work. It tells them briefly the general detail drawing to refer to; the piece number and cost number to charge the work to; the special jigs, fixtures, or tools to use; where to start each cut, the exact depth of each cut and how many cuts to take; the speed and feed to be used for each cut; and the time within which each operation must be finished. It also informs them as to the piece rate or the premium to be paid for completing the task within the specified time (according to the system employed); and further, when necessary, refers them by name to the man who will give them special directions. This instruction card is filled in by one or more members of the planning department, according to the nature and complication of the instructions, and bears the same relation to the planning room that the drawing does to the drafting room. The man who sends it into the shop, and who, in case difficulties are met with in carrying out the instructions, sees that the proper man sweeps these difficulties away, is called "the instruction-card foreman."

Time-and-cost clerk. This man sends to the men through the "instruction card" all the information they need for recording their time and cost of the work, and secures proper returns from them and refers these for entry to the cost-and-time clerks in the planning room.

Shop disciplinarian. In case of insubordination or impudence, repeated failure to do their duty, lateness or unexcused absence, the shop disciplinarian takes the workman or bosses in hand and applies the proper remedy, and sees that a complete record of each man's virtues and defects is kept. This man should also have much to do with readjusting the wages of the workmen. At the very least, he should invariably be consulted before any change is made. One of his important functions should be that of peace-maker.

71. *Summary of essentials in all types.*—The keynote in management is *unity of purpose*, the working

together in mutual dependence for a single result. The best organization is that which brings about the closest cooperation among departments.

Although it is difficult to strike definite lines of cleavage between the various types of management there are four principles underlying all organization, whether functional or military.

1. Planning and performance are separate functions. The management must have a head, be it one man or a formal planning department. All planning and designing should be done on paper. No one questions the utility of the drafting room. Then why question the utility of the planning department? It is much cheaper to erase a line than to do a job over again. The cut and dried method is the most expensive there is. The establishment of a formal planning department does not mean making additional work. It simply means concentrating the planning, which must in any event be done, where it can be done best. The danger in separating planning from execution is that the designers may get out of touch with producing conditions and in time become pedantic. To prevent such a happening the Germans require staff officers to do regimental duty after two years of staff service. Mr. Taylor insists that instruction-card men be able to justify their allowance by doing the work themselves when questioned. It is also now generally agreed that a planning or drafting office should be placed in the center of the shops, the office men encouraged to go out and get acquainted with shop methods and the better workmen encouraged to enter the offices.

2. The organization must furnish the information necessary to intelligent planning; it must get the facts.

3. Each workman in each part of the organization

must be given all the conditions and facilities which he needs to carry on its work.

4. The workmen must be secured, trained and handled.

Organization is absolutely impersonal. Each one of these principles applies regardless of who does the planning, who gets the facts, who furnishes the assistance. In order to keep traffic moving in New York it was found necessary to organize the traffic. When two drivers meet in a narrow street it is immaterial as to who backs out, but unless one does traffic is going to stop. At this junction the traffic policeman does the planning and the blockade is raised. It is not that he has superior ability, but merely that to insure unity of purpose, which is the distinguishing feature of organization, planning must be distinct from execution. If thirteen men are working in a ditch, some one, be it a foreman or a planning department, must coordinate the activities or they are not going to work together.

72. *Two corollaries of management.*—Let no man become indispensable. Shape your man to the organization, not your organization to the man. Let no man be able to become indispensable to the organization and so by his absence through sickness or intent tie up the work. Understudies are now the order of the day in business as well as on the stage. Each officer even up to the president is required to train a man who can take up his work in an emergency.

Executives of the old school object to this practice. The National Cash Register Company when adopting it, after repeated requests of its higher officials to select understudies, found it necessary to intimate pleasantly that if the executive did not train the man it would be necessary to get some one else to do so. After the

system was once established, however, the very men who had opposed it became enthusiastic because it gave them more freedom. When occasion arose they could devote themselves to special work, by temporarily letting their understudies handle the regular routine.

73. *Shape the man to the organization.*—Shape the man to the organization, not the organization to the man. Organization dictates that the best men should be placed at the head to plan and organize the work for less able men. When exceptional men assert themselves they should not be allowed to break down the machinery and do the work bare handed but should at once be given important positions where they can by constructive work strengthen that machinery. In fact, it is to such exceptional men that the rule applies with special force: "Let no man become indispensable." For if he does, the organization collapses with his exit. He ruins instead of building up the company. The notable movement of our time by which successful individuals are incorporating their companies, thereby voluntarily subordinating themselves to their ideas, shows that the really big men recognize this impersonal nature of organization.

While these four principles contain no fundamentally new ideas they sum up all the principles of "scientific management." The method of the efficiency engineer is distinct not because it enumerates new principles, but because it applies in greater detail and in a more systematic way principles which are well established and in universal use.

The most primitive form of management and the form which is still the most efficient in small matters is observed in those cases where the owner carries his "office in his hat." This primitive owner or foreman per-

forms each one of these functions. He plans the work of the office, he digs up the information he needs, he provides the necessary machines and materials and hires and instructs his workmen. When the establishment grows beyond the capacity of one hat some or all of these functions must be delegated to others. He hires a draftsman, and a bookkeeper and lets his foreman hire and instruct the workmen. As the work increases other departments are added as needed and the organization becomes more complex. Permanent progress in this world is after all a process of evolution, not revolution. Steadily from generation to generation the efficiency of manufacture, of agriculture, of transportation and of all the many other activities which form a part of our complex civilization, has increased. Though our methods are still far from perfect we may look forward to a similar or even greater progress in the future.

CHAPTER V

MODERN AIDS IN MANAGEMENT

74. *Real management is concerned with policies, not details.*—Most managers will admit that they are handicapped because they must attend to too many details. Foremen, superintendents and bosses will generally admit that they are overworked. Yet if a superior officer should suggest that some of their duties be lightened or removed, how many of these men would submit without any protest? It is this factor in human nature, which does not wish to surrender any element of authority, that stands in the way of progressive management more than any other. One frequently hears the remark made that the head of the concern is the last one to be convinced that his own organization might be helped and his own effectiveness increased if some of his responsibilities were shifted to the backs of other men. He is more likely to object because he has more authority to surrender than the men below him.

However strenuous may be the objection in certain quarters to any particular system of scientific management, it is generally conceded that there are certain aids which will help the manager to lighten his burden and increase his efficiency without surrendering or lessening any part of his total authority. Not all of these aids, of course, can be mentioned, but a few which have been tried and found successful will be given. Perhaps the simplest aid is that of a chart showing the form of the organization, the effectiveness of which will be much

increased, if it is supplemented by an organization record. Other devices which are gradually being adopted in whole or in part are the planning department, time studies, standards, mnemonic symbols, bonus rewards for labor and welfare work.

75. *Organization charts.*—A chart showing clearly the line of authority and of responsibility of each individual in an organization will go far toward removing many inter-departmental jealousies. The chart should be so simple that it is self-explanatory upon inspection. Each man's position is thus made perfectly clear and he easily informs himself as to what course to take when transacting business with other departments. If applied to a factory, each workman will know to what particular gang boss or job boss he is directly responsible; each gang boss or job boss will know to what foreman he must report; and each foreman will know to what superintendent he is responsible; and each superintendent will know where his authority begins and ends with respect to other departmental heads. Furthermore, the chart should show who is responsible for machines and equipment. To be most effective the chart should be hung in a conspicuous place. Each of the manufacturing departments should have one as well as the office; 24x36 inches is a suitable size. When made in the form of blue-prints charts are inexpensive, but they should be framed and protected by glass, to shield them from pencil markings and other injuries.

76. *Charts clarify ideas.*—These charts will not only prove themselves an aid in instructing the employes in the workings of the organization, but they will be found to be of great value in helping the manager to clarify his own ideas and in adding to his information regarding his own organization. Any manager who

has never planned a chart of this kind will be surprised to find how many gaps there are in his knowledge of his own plant. Furthermore, the making of such a chart compels the manager to look upon his organization from the point of view of functions and activities rather than from the standpoint of the persons who are running the business.

This elimination of the personal equation is one of the first things which the manager must accomplish if he would obtain absolute control of his business. He can then look at his organization as though it were a machine, and having studied the various parts and their functions he can then take up the question of the personnel and compare the qualifications of the men who might run that particular part of the organization.

The following chart (Fig. 10) brings out in a graphic way the elements mentioned above. This particular form of organization was taken for various reasons. It is a good illustration of that type of organization in which the departmental or functional principle is carried out in a modified way to suit a small industrial plant. Furthermore it shows the position of the planning department relatively to the other departments.

It will be noticed on this chart (Fig. 10) that the press shop is divided into groups of men and machines. Each group has a gang boss, who is responsible to the press shop foreman. The departments other than the press shop are all small and employ but few men, except the tool room and die shop. The erecting floor is in charge of the gang boss under whom are several assistant gang bosses, according to the number of jobs or different kinds of work in process on the floors assigned.

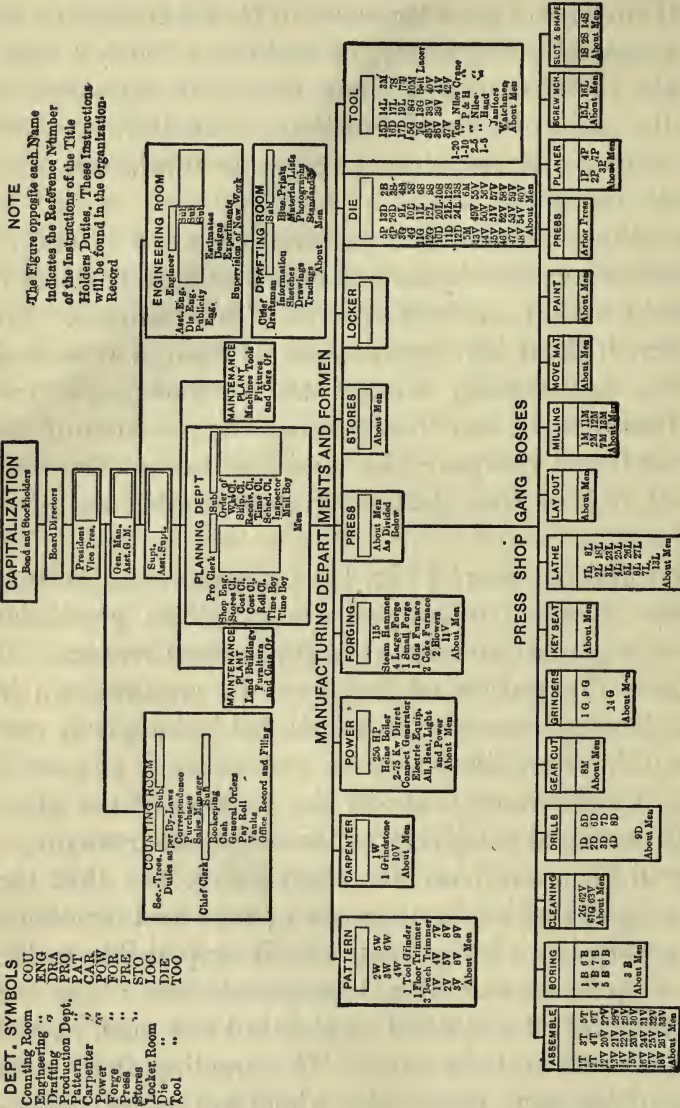


FIGURE 10.—ORGANIZATION CHART OF THE FERRACUTE MACHINE CO.1
Adapted by permission from Parkhurst's "Applied Methods of Scientific Management," p. 8.

It will be noticed that the planning department is the medium through which the superintendent controls the shop. All orders, designs, detailed drawings, supervision of new work, etc., emanating from either the counting room or the engineering and drafting room, pass through the superintendent's hands and the planning department before reaching the manufacturing department.

77. *Organization records.*—The organization chart will meet its full possibilities only when it is supplemented by the organization record. This consists of a book of written instructions covering the duties of each person shown on the organization chart. Copies of this record are furnished to each employé or officer concerned. Managers who add this important aid to their equipment will promote their interests in three ways: 1. Oral instructions are often misunderstood, but more often they are forgotten; 2. Writing out instructions generally clarifies the ideas of the men who issue them; 3. It leaves a permanent record of all instructions which have been issued, often avoiding, as a consequence, many confusions and conflicts of authority. Verbal instructions leave no written record for future incumbents of the position. Employés who are removed to other departments or who leave the employment of the firm altogether often carry with them knowledge of important details which the firm is likely to lose because the foreman, not appreciating the importance of these details in the work, neglects to see that they are kept up. Under proper written instructions, however, this could not occur, for all important details are noted as being a part of the whole operation.

78. *Written records a basis for standards.*—It should be noted here also that a slip of written instructions is

absolutely necessary if a manager wishes to adopt one of the further aids mentioned later on, namely, predetermined standards for the accomplishment of his work. If such a record is properly kept up it will furnish the management a complete account of all the details of the business. Such a record will also contain all the forms from the accounting and other departments with full description and explanation of their uses.

It need hardly be mentioned that all changes of the instructions should be written out and copies handed to the persons affected and a duplicate posted in the organization records. It may not be necessary to record the duties of the manager, but beginning with the assistant manager and continuing on down to the lowest man in the organization, the record should contain written instructions covering the specific duties of each man. These instructions, if compiled in book form, would make a good-sized volume, and the collection of the data requires much time and labor. Even after the information is gathered it has to be continually revised. These are objections generally offered against adopting it as an aid to the manager. If all this information which is floating about in the possession of the employes, but unknown to the manager, is vitally essential to the accomplishment of the work, then it is well worth while to have it put down in writing even though it does require much labor and money.

79. *Planning department.*—One of the commonest sights in the ordinary machine shop is to see men running here and there looking for tools, materials or for further instructions. To a greater or less extent this is true in every business which has not adopted some method of routing material or tools to the mechanic and supplies to the clerks and operators whereby they may

be supplied with everything necessary to carry out their work. Such a condition denotes a lack of strict supervision. This situation has grown up largely because industries have increased so in size, that is, each business has been adding to its equipment and to its labor force; on the other hand, however, it has not had a correspondingly large extension in the departments of management and administration.

A machine shop, for instance, employing a superintendent and a foreman would be called upon to supervise the efforts of 125 men or more. They were perhaps given clerical assistance to the extent of two or three clerks; and such a situation might be considered an ideal one by many managers. The so-called non-productive labor has been reduced to the minimum. Such managers, however, lose sight of the fact that the brain energy, namely, the planning which must accompany every operation, forms the greatest part of the work. It is the same old story again of making the brain save the heels; and in an office, shop or factory when the heels of the employés are working, generally some machine or important costly device is being left unused and the output is being restricted by the unproductive activity of both men and machine. A flock of "order chasers" running through a plant is a sure sign that there is little direct supervision or centralized control of the productive process.

The motto of many business executives seems to be "millions for machines and expert machinists, but not one cent for supervision." Money spent for men who would plan the work before it enters the operating department is looked upon as tribute. It appears that one of the best aids in overcoming the handicap imposed upon the manager by the extensive operations which

must be urged on under modern business conditions is the establishment and maintenance of a planning department.¹

80. *Planning is specialized management.*—Planning is carrying the idea of specialization which has been operating in the production side of our industries for the last hundred years into the supervising activities. Specially trained men must plan and analyze all the work, methods, etc., and prepare the way for the workman to produce at his highest efficiency. The workman is skilled in his trade; he is a specialist. The man in the planning department is skilled in analysis and he also is a specialist. The duty of the planning department is to find “the one best way” for doing a thing before a cent has been spent either in labor or material. It designs the job, prepares proper details and drawings, analyzes the work in its various elements and routes it in its future progress through the office, store or shop. When this is done it is easily seen that the greatest part of the work has been accomplished, for planning means brain work. The savings made after the introduction of such a department are not always of the spectacular kind, such as were effected when the new tool steels were first introduced; nevertheless the gains are important even though they are made up of innumerable small savings.

81. *An example from the machine shop.*—Mr. H. K. Hathaway, Vice-President of the Tabor Manufacturing Company of Philadelphia, related an experience before the Dartmouth conference on scientific management which is very much to the point.

¹ It may be well for the reader at this point to turn back to Chapter IX in Part I and review the brief sketch of the organization of the planning department there given.

In the assembling department of the Tabor plant, at the time we started to install the planning department we had eleven men acting as erectors, putting up machinery, and they assembled about nineteen machines a month on an average. Now we have six men, and they assemble between sixty and seventy machines per month.

It might be interesting to know to what that is due. Under the old scheme the assemblers were assigned a job by the foreman. An assembler would come up to the foreman and want to know what he should do, and the foreman, after looking around, would decide that he might as well start assembling a machine or a lot of machines. Apparently the materials were all on hand. There were at least enough of the larger parts so that it looked as if he had enough to start on. The man would start to assemble a machine. He would progress to a certain point and find some small part missing, without which he could not proceed with his work. That, of course, would necessitate his looking around to find where the part was. In a good many cases he would wait. He would go to the machine shop and inquire from one man to another until he finally found whether it had been made or not. If it hadn't been made, he frequently would wait until it was, keeping out of the way of the boss until he could proceed with his work. So about as much time was spent, under the old scheme, in hunting up the materials and waiting for materials as there was in actually doing the work. Another source of delay at that time was that a man would start to assemble certain parts, put them together, and find that they wouldn't go together. That would necessitate his chipping, filing, and scraping, until he finally could make them go together; in other words, correcting errors of the drafting department and of the machine shop. Such conditions do not exist under the new scheme. A man is never started doing assembling work until we are sure he has all of the materials on hand which are required to complete the assembling operation assigned to him. The parts, as they are delivered from the machine shop, are placed in certain racks or bins. The parts from the stores

are delivered at the proper time, and when all of the parts which enter into a certain group of the machine, or the entire machine if it is a simple one, are ready, we issue an order for one of the assembling men to perform certain features of the operation. In that way we eliminate the time wasted in hunting around for material for the job. We get away from the chipping and scraping and filing finally necessary to make things go together, to an adequate scheme of inspection. There is no question in the mind of the man doing the machine work what the requirements are. As soon as the job is put on the machine, the inspector goes there and instructs the man as to the degree of accuracy required, the kind of finish and any other matters pertaining to the quality.

When the job has been finished, the inspector goes there again and inspects every piece in the lot, with respect to that operation, to see that no errors have been made. If there have been, they are at once reported and corrected, before the material arrives on the assembling floor. Formerly they were not corrected, and were not discovered until the material arrived on the assembling floor. It is the case in many shops to-day, even comparatively well-run shops, that errors are not discovered until the material has reached the point where it is to be used. By eliminating those two sources of trouble and by doing certain things to assist the workman, such as having materials placed on his bench or on the floor for him in advance, and having his drawings and his instructions delivered to him in advance, we have been able to increase the output of the assembly from two machines per man per month to nine machines per man per month.

82. *Planning and overhead expense.*—The chief objection offered by many managers to the introduction of the planning department is the added overhead expense. They look upon all planning expense as non-productive and when it means that there shall be one man for the planning department for every three to five

men in the operating department the proposition appeals to them as absurd. Besides this the outlay for printed forms and office supplies is largely increased. But before judgment is passed it is well to look at the results. If the total net cost is not increased it makes little difference whether the money is spent on producers or the so-called non-producers. In the case presented by Mr. Hathaway the total number of men employed under the new system was not more than that employed under the old system. They were simply distributed differently. Under the old system he employed 125 men in the operating end and two clerks in the office. With the planning department added he now has 100 men in the shop and 25 in the planning room.

The overhead charges naturally increased but they were far from being "non-productive." The product turned out was three times what it was before this new aid to the management was added. Such an outcome simply puts the addition of a planning department on the basis of any investment. It is in reality spending money looking to future increased returns. Mr. Parkhurst claims that for a shop employing a few hundred men only about six additional employes in the new planning department were necessary. The cost for the six additional men in wages totaled about \$4,000 per year. For additional stationery, office room, etc., this sum was increased by \$1,000. But this change brought about a doubling of output, not to mention the permanent assistance obtained by the manager through having at hand a force of men investigating, collecting and utilizing knowledge which he could not possibly get unaided.

83. *Evolution of the planning department.*—The

organization of the planning department is a natural evolution of much interest to the student of management. Under the traditional system of management the foreman and workmen after deciding in a general way what was to be done put the job into the shop and studied out how, when and where it was to be done after the operation had been set in motion. It is perfectly evident to most managers to-day that it is not safe to trust the planning of what is to be done to the men who are to supervise the execution of the work. But it took many years before the establishment of the drafting department was considered anything else than an extra expense or burden. Just as the planning of what is to be done before the work is put into the shop was found to be even more economical when put into the hands of special experts, so will there be even greater savings when the planning of how, when and where the work shall be done is taken from the shoulders of the foreman and the men in the shop, and is also put in a special department called the planning department. It will be seen at once, therefore, that nothing is done in the planning department that does not have to be done by someone in the place under any scheme of management. Some workmen are good at planning their work, but others are not. Thus, it appears, if the best man in this respect is selected for the position of planning the work, all the less efficient men will get the advantage of his greater sagacity.

84. *Thoughtful plans make valuable records.*—Not long after such a man is put in full charge of the planning it is found that a greater force even than his intelligence is developed. This is the classified and recorded data which is gradually accumulated, and which becomes a source of knowledge in planning the best meth-

ods greater than that furnished by any individual man's experience.

85. *Advantages of planning in advance.*—It is easy to show the advantage of planning ahead in order to provide necessary materials, tools, etc., but to make men see that it is just as necessary to plan the movements, operations, etc., ahead is more difficult. However, where this has been done further subdivisions of the planning department are necessary. The work of the planning department is divided into two general classes, planning *how* each job is to be done and planning *when* it is to be done. Under the first heading come the following specialists: route clerks, instruction-card men and time-study men. Under the second heading come the production clerks and the order-of-work clerks. It was soon found, however, in shops making a diversified product that further subdivision of the work in the planning department must be made. Accordingly, we find men performing duties such as recording clerks, balance-of-stores clerks, foundry clerks, clerks who write up the numerous details, make out orders, tags, etc., time-keeping and cost-keeping clerks, and various others.

86. *Proportion of planners to doers.*—The question of how many of these men will be needed in the planning department depends entirely on the nature of the specific business. Some businesses will require two or more men for each of the positions, whereas in others two or more of the functions may be put under the direction of one man. In one shop, for instance, employing several hundred men, four clerks in the planning department handle all the work, while in another concern, employing only about one hundred men, twenty-five clerks are necessary. The first concern manufac-

tures a limited variety of products in large quantities under standard designs; the second concern manufactures a great variety of goods in small quantities and with frequent necessary changes in their design. In the first case a man at a machine may run on the same job or a similar job for a month, whereas in the second concern each workman is employed on three or four different jobs every day. It will be seen at once, therefore, that a description of any one planning department will be incomplete, but for our purpose it is best to take the more complex form where the duties of the various men have been clearly differentiated and put into the hands of individual persons. This will make it easier to explain and much easier to comprehend, since each function will have an individual man to carry it out.

Perhaps the organization of the department can be most easily understood if we take up the duties of each clerk as they arise in planning for a manufacturing order. Each man in turn will receive this order and work out the plans which come under his jurisdiction.¹

87. *Planning room of a manufacturing concern.*—The example cited is that of a manufacturing concern. Its planning department is composed of the following: (1) production clerk, (2) route clerk, (3) foundry clerk, (4) balance-of-stores clerk, (5) instruction-card clerk, (6) route-file clerk, (7) order-of-work clerk, (8) recording clerk, (9) mail carrier, (10) tickler clerk, (11) time-and-cost clerk, (12) stenographers, messengers, etc.

88. *Coordinating function of production clerk.*—The great problem of management as soon as the process of

¹ It must not be assumed, however, that this sequence is absolutely necessary. There are cases where several of these functions may be performed at the same time; that is, two or more of these clerks may be working out their plans at the same time.

specialization has taken the duties of one man or of one department and divided them among several men or several departments is to bring about an efficient co-operation among the various parts which have thus been separated. When an enterprise grows to anything like normal proportions, it is necessary to separate the sales department from the manufacturing department. No sooner is this division made, however, than difficulties arise. The sales department sends in orders and expects the manufacturing department to get them out on scheduled time. As every business man knows, these expectations are not uniformly realized, and friction arises as a consequence. A reducing of this friction and the bringing about of a greater amount of coöperation between these two departments is one of the chief functions of the production clerk. He is in a true sense a coordinator, the connecting link between the sales force and the shop. The sales department depends upon him for information upon which to base its promises of delivery. He is, in fact, responsible to the sales department for making these deliveries at the time promised.

89. *Setting sales delivery dates.*—To set his dates, however, the production clerk must have information other than that supplied by the sales department. He, therefore, first consults the stores clerk and learns what manufactured articles are required for stock. With this in mind he then sets to work to prepare a schedule, or, as it is called, an order of work. This order contains a list of all orders in hand for each department, arranged according to their relative importance. The relative importance of an order is, of course, determined by many conditions, but in general the classes into which most of the manufacturing orders may fall

are as follows: (1) the emergency class, (2) tools or appliances, (3) manufacturing orders, (4) orders for stock parts, (5) orders for stock machines. As soon as an order comes to the production clerk, he classifies it under one of the above classes. It need hardly be said that the emergency job has the right of way through the factory in preference to any other job. But the production clerk must first consult the manager before an order can be placed under the emergency class. An order in class 2 would have preference over any of the others which follow it, for such an order would arise only when the work under way was being held up because of a broken tool or a lack of appliances, etc. Class 3 comprises all those orders for products not carried in stock but which must be made up after the customer's order has been received. This class may be further subdivided into definitely dated orders and orders which can run on and be completed at the manufacturer's convenience.

At regular intervals whenever the need arises the production clerk revises the order of work for each department.

90. *Further duties of production clerk.*—The schedule having been made out, the production clerk must now see that its requirements are observed in the drafting room, in the planning department itself and in the shop. In fact, his duties now are largely those of "checking up." After having fixed a date for the completion of the job, and having placed it on the shipping order, he files the memorandum away in the tickler. When the date arrives for this job to be started, his record appears automatically and he checks up the drafting department by it. A like method is pursued in checking up the planning and the delivery of ma-

terials. The tickler is to the production clerk what a cab window is to an engineer on a locomotive; these men must be constantly looking ahead to assure themselves that the track is clear. If obstructions appear the production clerk must arrange to have them removed in plenty of time so as not to interfere with the general order of production.

In watching the progress of the work through the shop the production clerk has further aids to help him in detecting things that go wrong or may go wrong. These are the route sheet, the progress sheet, and the bulletin board. The method by which the production clerk checks up the progress of the work in the shop is interesting because it differs so widely from the practice in common use. His mind is continually on the promise he has made to the sales department that upon a certain date a certain delivery can be made. He therefore begins his daily checking up of the progress of work not by first looking up the orders due to be shipped to-day, or those overdue, but on the contrary he starts at the bottom of the list and makes sure that everything necessary to the completion of the order just received is on time and is being carried out to the letter. He works up the list instead of down and the last item to receive his attention is the order which is to be shipped to-day. Mr. H. K. Hathaway in the *Engineering Digest* for July, 1912, says:

The principal cause of the failure to complete orders on time is that little or no attention is given them on this score until the date of shipment approaches. In machine shops a great deal of time is ordinarily wasted in getting drawings and patterns made, and getting materials into the shop. This time cannot be made up after the work is started, and the

effort to do so results in confusion, decreases the efficiency of the plant, and causes more or less friction among the individuals comprising the organization.

91. *Qualifications of production clerk.*—The production clerk need not necessarily be a man trained in the technique of the particular business which he serves; however, if he is in the planning department of an engineering concern, it will be much to his advantage, and add to his efficiency, if he has had two or three years' shop-practice experience. Of course, he must be familiar with the processes of manufacturing, for upon them depends *when* a certain operation is to be done. It may also be well to mention here that the authority of the production clerk, like that of all other members of this department, is supreme in his field. Even the manager or superintendent must respect his authority. But when he has planned the time when certain work shall be done, his authority ceases. He has no right to say how or what shall be done at any time.

92. *Route clerk.*—The function of the route clerk is to show *how* a thing is to be done. As soon as the drafting department has shown what is to be done, the planning of the work proceeds to the route clerk. It is his duty to take the information which comes to him in the form of drawings and bills of materials and plan *how* the product shall be made. He must be able to read readily the drawings from the drafting department; he must understand machine construction, so as to analyze it and put in writing or in chart form the methods which show how the manufacture is to be carried out in the shop. Furthermore, he must be thoroughly familiar with the location of all

the machines and their capacity, so that his routing of the material may be the most efficient possible.

93. *Method of work for the route clerk.*—In preparing his outline or his diagram, the route clerk proceeds about as follows: (1) Having analyzed the construction of the machine he divides it up into groups or parts. (2) He studies the length of time it will require to get the castings or various parts that require special construction and the amount of time necessary to work up the various parts and assemble them. This enables him to decide the relative importance of these various groups and with this scale or order of importance in mind he is enabled to lay out the first draft of his chart or diagram, which embraces only the various groups. (3) Each group is now considered separately and a special diagram or route chart is made for it. This will include in their order of relative importance all parts that go into the order, the operations to be performed upon them, the machines that are to perform the various operations and the material required for each part indicating whether it is to be purchased from the outside, made especially for the job, or to come from stores. (4) He applies to each part a suitable symbol. This identifies the part as it goes through the shop, indicates what part of the machine it goes in and serves as an operation order-number and an index to the instruction card which is made out for the several operations. In fact, this symbol is used in connection with all the processes involved in the manufacture and planning of this job, at length serving the cost keeper in keeping his records and finally becoming a basis for filing any data which may pertain to the piece that it represents. (5) Under instructions from the route clerk another clerk prepares route sheets and progress sheets

upon which the movement of the work through the shop is recorded. In fact, it is here that the various operation orders, inspection orders, stores issues, etc., originate.

The work of the route clerk in a very large plant becomes very involved, and requires that the duties of the office be subdivided. Thus there will often be found one expert who gives his whole time to the making of route charts pertaining to the assembling alone. Other experts will be engaged solely in laying out the various machine operations for the various parts; others again will compute the quantities of material required, etc.

94. *Qualifications of route clerk.*—When any man is put in a position where he must show other men how things are to be done, it seems unnecessary to mention that such a person should be endowed with much tact. Especially is this true with the route clerk who must consult daily with the foremen in the shop, seeking their advice as to the best method to be followed in machining various parts and assembling them into groups, etc. Even in the planning room itself he must be in continual conference with the various clerks of the department. It is the time-study and instruction-card men who can tell him which machines and what laborer can perform the work in the most economical manner, whereas the balance-of-stores clerk can inform him of the condition of the material and supplies.

95. *Special-material (foundry) clerk.*—Concerns that do a variety of work and do not keep all of the materials on hand find it necessary to order the special material from the outside. In cases where this is done continually, a clerk is provided to look after the special work in the planning department. He is frequently called the special-material clerk, but

in machine shops where the special material referred to is largely made up of castings which must be obtained from some outside foundry, he is then spoken of as the foundry clerk.

The duties of this office do not call for a man trained in the technique of the manufacturing business, but he must be a man who is wide-awake, for special work of this kind, especially if it is in connection with the foundry, calls for the care of a great number of patterns. The first duty then of the "special-material" clerk is to see that the patterns are stored and labeled properly. He must know whether they are in storage or whether they are at the foundry. The records will further show the date the patterns were delivered and the date they were returned. His next general duty is to make out detailed orders on the foundry, which order it is his further duty to follow up closely. Each order, therefore, is carefully scheduled showing the amount wanted, when wanted and the number in each lot. It has been found that the checking up of these lots when delivered from the foundry is a very important thing, since it requires the foundry to deliver the full number in each lot to complete the job before any order is begun.

Any one familiar with the common shop methods, where special materials are permitted to be delivered in broken lots, will easily see where a clerk of this description will soon earn his salary. Without him jobs are started when only a part of the material is on hand, only to be dropped again when the supplies run out. This often requires the machine to be re-set or to lie idle for a long time. Although this position is purely a clerical one, it requires much energy, because the clerk must see that this material is in the shop on time.

96. *Duties of balance-of-stores clerk.*—The taking of the “stores balance sheets” out of the storeroom and putting them into the planning department is one of the unique features of the planning department. The clerk who has charge of this department is called the balance-of-stores clerk. His chief duty is to keep a running inventory of each article carried in stock. His records are kept on what are known as “balance sheets.” The chief items which this clerk must look after are indicated on the sample sheet given below (Fig. 11). In brief they are: (1) the maximum and minimum quantity, (2) the actual quantity carried in the stores, (3) the quantity on order but not yet received in stores, (4) the quantity required for orders for shipment or manufacture to which they have been apportioned but not yet issued, (5) the quantity available for future requirement.

The detailed duties of the balance-of-stores clerk will be indicated by these items themselves. He will have various forms to make out, such as orders on the storeroom as soon as the route clerk hands to him his route chart and bill of materials. Although these duties are, largely those of a bookkeeper, nevertheless there are certain duties to perform, such as checking the balance sheet against the actual stores, that call for considerable expertness in the classification of the various orders according to their symbols since the stores orders are returned to him at the end of each day by the storeroom clerk.

Of course it is this clerk’s duty to inform the production clerk as soon as stock parts are running low and in case any of the materials are not available at the time of the apportionment, he must also notify the proper authority in the planning department when the

material does arrive, so that orders may be issued for the work to be started.

97. *Time-study clerk.*—As the function of time studies will be taken up later, it will not be necessary to say more here about the duties of the time study clerk than to mention that he must make such elementary time studies as are necessary to determine the best methods to be followed in the performance of each class of work.

98. *Instruction-card clerk.*—The man who holds this position should have a high appreciation of the importance of detail. This office is often combined with that of the time clerk because so much of his work depends upon knowledge obtained from the time study. His duties are clearly indicated by his title, which is to prepare instruction cards showing the method to be followed in performing each operation, what tools to be used, in what sequence the operation should be performed, the time taken for each operation, etc.

99. *Route-file clerk.*—When the route clerk has finished his sheet and diagram, he passes them over to the route-file clerk whose duty it is to transfer the information from these route sheets to suitable sized slips of paper, tags, etc., whereby the route clerk's information can be carried to the storeroom, to the shop and to the various other places connected with the performance of the work. For example, there will be an order on the storeroom for material from which the article is to be made, a tag to be attached to the lot or part, an order for each operation, for the inspection that takes place at the start of each operation and for the inspection of the work when it is completed on the lot and for moving the materials from one place to another.

These forms are made out for each unit into which

the work has been divided by the route clerk. An envelope sheet bearing its appropriate symbol whereby it can be easily recognized is then prepared. Into this are placed the operation orders, etc., pertaining to that unit. The envelope sheet is then filed for the record clerk's use whose work begins as soon as the work on this job starts.

100. *Order-of-work clerk*.—Although the route clerk has already shown how and where the work is to be done, nevertheless it requires another man to administer the order of work to the employes in the shop, and the medium through which he does this is the bulletin board.

As soon as the job is ready to put into the shop the record file is taken from its place and the various operation orders removed and put into possession of the order-of-work clerk. Being thoroughly familiar with the work of the plant, he knows the capacity of both men and machines. He sees that the various jobs ahead of each machine are taken up and performed in accordance with their relative importance. In deciding this he is, of course, guided by the schedule furnished him by the production clerk, already mentioned above. On the bulletin board will therefore be displayed each job and the machine to which it is assigned. Furthermore, it can be seen at once whether the job is being worked upon or whether it is to be done next, as soon as the job under way has been finished, or perhaps it may stand third, fourth, or fifth on the list.

This clerk, besides having a good memory, must also be endowed with considerable tact, since much of his information must come from the various foremen and inspectors in the shop. In this way he is continually posted as to the best workmen and the capabilities of

the various machines, as well as the grades of work each is capable of performing.

101. *The eye of the superintendent.*—Without going into the shop, therefore, the superintendent can see in advance what machine and what men are occupied. If for any reason the order-of-work clerk does not find work for any of the men, he must notify the superintendent or the proper person at once. Likewise it will be his duty to inform the proper authority in case there are not enough men to handle the work already on the floor or planned for during some particular period. The bulletin board referred to is the most important device in the planning department, but it will be described later when the routing of an order through the shop is taken up.

The order-of-work clerk is a very active person. He must continually and systematically go over his bulletin board. He must permit neither man nor machine to run short of work if it can be provided for, nor must he permit an important job to stand waiting while one that is less important is being worked upon. The great economy effected by the bulletin board is the saving of the lost time between the completion of one job and the starting of the next, the rule being to have preparations made in the plant for two or more jobs ahead for each workman.

102. *The recording clerk.*—On the route sheet each step in the progress of the work to be done on a lot or part is indicated, so that what has been done and what remains to be done is always evident. Each step, therefore, is clearly indicated and the time indicated when it is to be taken. Along with this information which has been filed in the envelope sheet by the route-file clerk also comes other important information, such

as tool list, instruction cards, designs, etc. Upon the information provided by these things, the record clerk performs his functions which are mainly to record the progress of the work, to issue and receive operation orders, inspection orders, move orders, etc., at each phase in the progress of the work.

103. *The cost clerk.*—This clerk is held responsible for all cost records. A system of management which employs a planning department uses its cost records for two purposes: (1) for keeping the records of the work which has been done over various periods of the past; (2) to show the condition of the work at any particular period when called for by the manager. The operation orders and other slips which are used in the administration of the operations in the shop, etc., at length become the basis on which the record clerk rests his work. As a job is finished, these slips containing the workingman's time, his rate of pay, his bonus, etc., come directly to the cost clerk.

Thus all cost sheets are kept up to date. All labor and other charges to the job at the close of work each night must be posted on sheets up to and including the progress of the day previous. The division of the cost clerk's work, mentioned above, forms the basis for a further duty, namely, managing the cost files. These files are of two kinds: (1) the live file; (2) the dead file. Only work in process must remain in the live file. When work is completed, ready to be shipped, or the job otherwise closed, the slips are removed from the file as soon as the cost clerk is satisfied that all charges that belong to them are posted. They are then put in the dead files and stand as records for future reference.

The cost clerk generally has an assistant who figures

up the pay roll and makes out the bonus rewards, etc. The cost records as kept under a system of this kind are very simple. All materials, requisitions from stores or from outside places, all time expended in the shop either as expense, or as work in process, will be posted on the cost sheet. A second sheet, known as the distribution sheet, will then show all the time as it is distributed daily. However, to describe the full duties of the cost clerk would take us too far into the field of accounting. A brief summary of the duties of the cost clerk as laid down in the book of instructions of one large company will suffice to show the cost clerk's duties in general:

The cost clerk should make it a point to daily close all cost sheets for work completed, after being sure that all the charges for these jobs have been received and posted by him. This cost includes material, labor and sundries, which totaled represent time cost. To this opposite expense must be added the prevailing overhead burden per hour. This burden, added to the time costs, represents the total manufacturing costs. Differential burden or machine hour is posted in each labor operation column. Each month the cost clerk must make a report to the general manager.

104. *Time-keeper.*—The first duty of the time clerk is to regulate all the clocks in the shop. The time clocks on which the men register in and out, he is required to watch closely. Each day the clock cards are checked up and totaled, the total being checked against the individual time card for each man and turned in by him or the gang boss or foreman each day. This insures the proper distribution of the exact amount of time which is shown by the time-clock card and for which the men will be paid. This time is totaled daily and distributed

upon the distribution sheet mentioned above in connection with the cost clerk's duties. This, of course, must agree with the cost clerk's entry.

105. *Planning introduces no new duties.*—It is not intended in the foregoing description of the various duties performed in the planning department, to cover all the ground that might possibly be included in a planning department. The description, however, will serve to show that there are no new duties or functions carried out in the planning department which have not previously been carried on in the shop. Those duties which could be easily separated from the purely operative functions have been taken and put by themselves. One important feature of this form of management is that the workmen have absolutely no clerical work whatsoever to do and it is not necessary that they touch a pencil or time stamp from the time they arrive at work in the morning until they quit at night. As L. M. Gilbreth says in a paper in *Industrial Engineering*:

Master planning is the last study. The best planner is he who—other things being equal—is the most ingenious, the most experienced and the best observer.

The art of observing is founded upon a study of the mental element. In order that planning may be done best, the entire sequence of operations must be laid out previous to starting the work, so that the ideas and values of every element of every subdivision of the process of work may be corrected to act most efficiently in relation with each and all of the subsequent parts and events that are to follow. This planning forward and backward demands an equipment of time-study and motion-study records such as can be used economically only when all the planning is done in one place, with one set of records. The planner must be able to see and control the whole problem in all of its aspects.

106. *Other functions associated with planning department.*—The duties of the disciplinarian, gang boss, speed boss, repair boss and inspector have not been touched upon here. The quotation from Mr. Taylor, in section 70, was considered sufficient to cover the duties of these men who are commonly spoken of as functional foremen. Although these men may be put into the planning department, they are more closely allied with the “performing department.” The planning department then, in contrast with the performing department, classifies its work in seven general functions, namely, (1) what is to be done, (2) the sequence in which it is to be done, (3) the method by which it shall be done, (4) which men shall do it, (5) the time that it shall take, (6) the exact quality of product, (7) the amount of additional pay that shall be given for doing it. The workers are given standard tasks to do. They have teachers to help them and they are given a standard wage according to the performance as a reward. The management, knowing what the planning department is expected to do, is also in full possession of just what the men in the shop are expected to do. The workers are expected: (1) to give their coöperation in carrying out prescribed work, method and quality; (2) to exercise their ingenuity in making improvements after they have learned the standard prescribed practice; (3) to fit themselves for higher pay and promotion.

CHAPTER VI

STANDARDIZATION AND EQUIPMENT

107. *Management a process of applying correct standards.*—A sound judgment is the prime mental attribute of a good manager. When a manager fails he is criticised for not using good judgment. But to accuse a manager of exercising poor judgment is only to say that he has used wrong standards in drawing his conclusions. Judgments are the results of comparisons. When comparisons are made we consciously or unconsciously use one of the things compared as a standard by which the other thing is measured. When the moon rises from behind the hills we say it is as large as a wagon wheel. When the moon rises overhead then we say it is as large as a plate. In these cases we have unconsciously compared the moon with the objects standing on the horizon and as the moon moves from one position to another our judgment varies.

A great economist once said that all economic activity in its last analysis resolved itself into the simple process of moving matter. It might with truth also be said that the problem of management resolves itself into a series of measurements. Every manager has some standard. The difference between a progressive and a non-progressive manager is largely determined by their attitudes toward the standards which they use. The one having decided that a certain type of machine or a certain kind of man or a method for performing an operation is the correct one rests contented to use these as standards year after year; the other is continually

on the lookout for improvements in his machines, men and methods, and frequently changes his standards in order that he may judge of his efficiency under new conditions.

When the Carnegie Steel Company entered the competitive fight which finally resulted in the formation of the United States Steel Corporation, it was truly a modern "battle of the standards." Mr. Carnegie proved himself to be the most progressive manager of the day because of his attitude toward standardization. While other companies were judging their efficiency by the capacity of old equipment, Mr. Carnegie was equipping his plant with new and up-to-date machinery. His standards were of the twentieth century, his competitors' standards were those of the nineteenth. Since Mr. Carnegie's success few men have questioned the necessity of continually watching their machine standards in determining the efficiency of their output. The general acceptance of this principle was a great step forward. Yet the problem connected with the determination of machine standards is a comparatively simple one when compared with the determination of those standards which are connected with men and become the basis of judging labor efficiencies.

To establish rational-work standards for men requires indeed motion studies and time studies of all operations, but it requires in addition all the skill of a planning manager, all the skill of the physician, of the humanitarian, of the psychologist, of the physiologist; it requires infinite knowledge, directed, guided and restrained by hope, faith, and compassion.¹

108. *Standards of labor efficiency.*—The difficulties of the problem, however, should not deter any manager

¹ Harrington Emerson in "Twelve Principles of Efficiency," page 275.

from beginning to study the conditions surrounding his workmen. The next great step forward in the organization of our industry will be along the lines of finding and adopting the true standard conditions under which men shall labor. Perhaps when the next great competitive battle is fought the manager who can measure his fighting strength in terms of labor efficiency will inscribe his name higher on the list than that of any of the great captains of industry of the past. Such a man will have standardized his conditions and will know that he will be wasting less time, squandering less effort and spending less money than any of his competitors.

As is mentioned above, every manager has standards of some kind. Evidences of these standards are seen in written specifications in the purchase of materials, goods, etc. But as we approach the operations which the men perform and the conditions under which they work these records grow rarer and rarer. Seldom do we find written specifications covering what might be known in a given concern as standard practice. But when it is realized that standard operations and standard efficiency are as valuable to a firm as standard materials and standard machines, then will the true functions of the planning department and its record of standard practice be seen.

Perhaps the commonest objection to adopting standards, aside from the difficulty of obtaining them and keeping a permanent record, is that it will destroy the initiative and incentive of the workman. Such persons seem to reason from the position that when a standard is once adopted it is to remain forever. But standards are ever changing and that is the reason managers are needed. No sensible manager of to-day will

ignore the suggestions of his men which may improve his standard practice. All that such managers require is that the man show himself capable first of accomplishing work according to the standards that are set by normal conditions. Absolute standards can never be set in business; therefore, there will always be plenty of opportunities for the exercise of the workman's ingenuity.

109. *Cautions in adopting business standards.*—Perhaps some caution, however, might be suggested regarding the establishment of standards. In business, that particular standard is desired which will produce the largest output with the least effort or cost under the conditions. One of these conditions is the human element. In a shop employing one hundred men, one man might be found who would be able to do a given piece of work three times as quickly as anyone else. If this man's accomplishment were taken as the standard and the other men forced to meet it, the output in a very short time would fall appreciably. The men working beyond their strength would soon show the result in their lagging energy. The excellent man's accomplishment should not be the standard for the good man's effort, because it is the latter upon whom the management must depend in the long run for its steady output. Normal conditions and not "spurt" conditions should control. The schedule should be made so as to embrace the general run of men, but permit a place for the unusual as well as the mediocre man. As Mr. Emerson says, there are places where the poor men may fit even as the tame goose plucked for his feathers and prepared for the feast shows one hundred per cent. efficiency, whereas a thin wild goose is far below par; but the efficiency would be reversed if flight instead of diet were being considered.

The schedule must fit the man and the man must fit the schedule. There is no such thing as an universal schedule.

110. *Standard specifications.*—Among the first departments into which definite standards were introduced were the purchasing and contracting departments. These have proved their worth to such an extent that every business is familiar with the practice. The extent to which specifications have been standardized is remarkable and significant of what might be done in other fields.

Too much emphasis cannot be placed upon the fact that standardizing is a continuing process. No specification is necessarily perfect and modifications and re-modifications must be made to meet constantly changing trade conditions and to correct fundamental defects which only experience will develop.

The quantity of each kind of material to keep on hand and the amount to get when ordering is the second step in standardizing materials. The object in view is to prevent the annoyance of running short (so common in all unorganized stock rooms), to purchase sufficient quantities, to secure good prices and still not to lock up an unnecessary amount of capital. This is done by establishing a minimum below which the stock must never be allowed to fall. The minimum depends upon how long it takes to get supplies delivered, how fast the material is usually used up, and how rapidly it deteriorates. Sometimes a secondary or emergency minimum is added to call special attention to the fact if the new supplies have not come in before a dangerous point is reached. The amount to purchase depends upon the saving to be gained through quantity buying, the room and help available for handling, the capital tied

up, the seasonal variation in prices and the amount that is used. These figures are generally placed directly on the material ledger accounts so that the stock clerk can see instantly when he is running low and replenish in time.

111. *Monetary savings due to standard materials.*—One of the big advantages of standard materials is the direct monetary saving. An examination of the supplies used will usually show a surprising variety in the kinds and grades of the same thing. The Commission on Standardization of the City of New York found that the city had 25 different standards for horses and numerous standards for coal. They have been able to classify all the city requirements under seven grades for horses and one specification for coal. So far, the commission's work has covered only one fourth of the city purchases, but if the 5 per cent. saving effected thus far can be applied to the whole \$22,000,000 which the city spends annually for supplies, the saving will be over a million dollars a year.

Since the introduction of standard materials is not hampered by existing conditions—new materials of one kind or another must be ordered from time to time—it provides the ideal way to start standardizing.

112. *Standard office material.*—Office material is a particularly good field for standardizing since differences in stationery rarely have any more logical basis than chance. For instance, many kinds of carbon paper, of typewriter ribbons, pencils, pens and erasers are found in every office together with many different shapes and sizes of account books and forms, etc.

113. *Example of standard drawings.*—The multiple system of standard size drawings which is universal in large drafting offices can be used to advantage in office

work. This system recognizes the fact that all drawings cannot be made on one size of paper even though such a result is very desirable. It therefore adopts a given large size as standard, which is divided into halves, quarters and eighths for smaller sizes. By this arrangement all drawings can be filed in one size cabinet by dividing the drawers to correspond with the smaller drawings. As the standard size sheet is always selected, the paper can be cut to the best advantage and without waste. For instance, if the standard or A sheet is 23 by 36, which is a stock paper size, the four sizes allowed in the office would be:

Full sheet A—23x36.

Half sheet B—23x18.

Quarter sheet C—11½x18.

Eighth sheet D—11½x9.

The multiple system has also been adapted to shipping, especially in seed houses where the packages for different quantities are all multiples of each other. This permits all orders to be packed in one size box; and orders too large for one box can be packed in several separate boxes and the boxes nailed together with strips on the outside. This saves storage space in the shipping room and greatly facilitates the routine.

114. *Standard equipment.*—Better all second-class machines than many first with a few second and third class; because the operators on the first-class machines will regulate their speed to that of the workmen on the second and third-class machines. Thus the efficiency of the first-class machines is always lowered to that of the poorer ones.

All machinery, however carefully watched, wears out and breaks down. To avoid costly delays it is therefore necessary to carry repair parts in stock. If one

type of machine is used, one set of parts will care for all breakages. The probabilities are against two machines breaking down in the same way at the same time. If two kinds of machines are used, two sets of parts become necessary because the parts of one will not interchange with the parts of the other. If many makes are used, many sets of repair parts are necessary. Unproductive capital is locked up in these parts, increasing the indirect expense. Machinery manufacturers are waking up to the importance of this matter of repair parts, so that it is now possible to get a complete range of tools, the parts of which are more or less interchangeable; and fewer parts consequently need to be carried in stock. It is also good practice to select the entire equipment from one or two firms, provided the purchaser does not become too dependent upon one source. The inherent advantage of the individual machines of many different firms are often more than offset by a gain in uniformity. Where a firm makes much of its own machinery it is advisable to carry out the same idea.

115. *The principle as applied to delivery systems.*— That the tendency with large companies is toward a standardization of their delivery and office equipment no less than their production machinery is shown by the following advertisements:

Another big order for — trucks was placed yesterday— an order for ten from the Long Island Express Company. This concern already has ten — trucks, purchased on January 31, 1911. The re-order makes twenty of them, all told— \$72,000 in — trucks.

Rather significant is this order. When a big company invests as much money as this in one manufacture of truck, its own answer to the motor truck question is clear.

But consider for a moment what other express companies have in the way of — trucks: American Express Company, 27; Westcott Express Company, 11; Adams Express Company, 4.

These three express companies have an investment in — trucks of \$161,000. Four companies, all told, total \$233,600 in — trucks—an investment that is greater than the capital of many motor truck manufacturers.

116. *Interchangeable parts.*—More important than the number of designs is the matter of standard or interchangeable parts both in the same machine and between an entire line of machines. Mr. C. U. Carpenter in his "Profit Making Management" summarizes as follows:

The great advantage of standardized products is, of course, apparent. It means cheapening production through duplication of parts and ease of handling; increase of output per square foot of floor area through quicker production, and the consequent reduction in indirect expense per piece; the possibility of building for stock in slack times and so keeping up the factory output; quicker deliveries and more orders, better satisfied customers, and a more rapid turning over of working capital.

The differences in legs, screws, pins and other unimportant parts of machines are largely the result of the individual designer's whim, and should be made uniform. The Engineering Standards Committee of the Society of Civil Engineers discovered in their investigations that a large part of the differences in British rolled sections had been deliberately introduced by the manufacturers, so that duplicates and repair parts must be ordered from the original maker; and that, in place of having the desired result, this action, through the need of special tools and dies and the expense of changing rolls, had so increased production costs that the Ameri-

can and German plants were gaining the trade by under-selling. Where small parts are standardized, their continual re-design is eliminated so that the designer can concentrate his skill on the essential elements of the problem.

The importance of interchangeable parts was first enunciated by Joseph Whitmore in his paper on "A Uniform System of Screw Thread" read before the British Institution of Civil Engineers in 1841. It was first generally adopted by American watch manufacturers. During the middle of the last century these manufacturers made a lasting impression on foreign engineers by dismantling two going watches, mixing the parts with similar unused stock parts and then without any fitting re-assembling a going watch from one of each part selected by the visitors. Similar astonishment has been occasioned in more recent times by our automobile makers, performing the same severe test, dismantling a car after a long run, mixing the parts with similar stock parts and after re-assembling making another long run.

117. *Use of "limiting dimensions."*—To insure the fitting together without any filing of parts which have been made by different workmen, the system of "limiting dimensions" has been developed. This system provides that important distances shall be so marked as to the maximum variation allowable if the part is to match with its neighbors. The workman thus knows where special accuracy is required and is supplied with limiting gauges for testing his work.

118. *Use of symbols.*—Convenience is promoted by the use of symbols. A good symbol system must be: (1) unmistakable; (2) easy to remember; (3) brief.

The usual terminology of tools and parts is very

loose. The meaning in which words are used differs widely among different firms, and the same word is often used for several ideas, it being necessary to determine which one is intended by the context. The first step in symbolizing, therefore, is to adopt definite names in accordance with current commercial usage as well as with dictionary definitions. As one of the chief purposes of a symbol is to correct the slackness of common usage, it is essential that each symbol be applicable to only one definite thing or idea.

119. *Constructing a system of symbols.*—A symbol consists of two things, a sign and a position. The sign may be a letter, a figure, some borrowed character, such as a Greek letter or something manufactured to serve the purpose. Where there are enough signs to indicate all the classes, position is unnecessary. This is the case with the chemical symbols. “N” stands for nitrogen whether it is at the beginning as in NH_4Cl (Ammonium chloride), in the middle as in NaNO_3 (Sodium nitrate) or at the end. Where, however, there are not enough signs to go around, significance of position is added. The digit 6 means sixty in the second place (60) and six hundred in the third (600). Where letter symbols are united to form groups, combinations of capital and small letters as in the chemical symbols are preferable to all capitals because spaces are more easily distinguished. Each succeeding capital represents a place. In using numbers, it must be remembered that the range of any one column is 0 to 9, not 1 to 10. Where letters and numerals are used together it is better to alternate them. It is also advisable to omit the letters I and O lest they be mistaken for one and zero.

Symbol systems are “standards of measure” and must not be continually improved. In order to avoid con-

fusion they must be definitely, even if arbitrarily, established. In fact many of the speakers before the American Society of Civil Engineers have claimed that this is the great advantage of a number system, since such a system makes no attempt at being logical. When it is once established there is no temptation to alter it.

Mnemonic means "aiding or designed to aid the memory." The advantage of having symbols mnemonic is that there need be less referring to charts and less likelihood of mistake. As a general rule, letters, especially when related to the words they stand for, are more easily remembered than numerals. The two-letter system is the one most generally used. Its 676 possible symbols are ample for most requirements. The letters should be either: first and last letters as Rm, for Ram; or first and second letters as Fr for Frame; or first and a letter indicating the sound as Dy for Die. Where none of these combinations is possible the same end can be attained by making the letter so extremely inappropriate as to be conspicuous. This is doubtless the idea back of the X for Inkstand in the Derby Desk system described below. The memorizing of symbol systems is not so formidable a task as it appears because each man uses but comparatively few of the total number and need remember only those he uses.

120. *A working system.*—As one example among many that might be given, of a well-constructed system, take the symbols used by the Derby Desk Company. In this system the following capital letters, the mnemonic value of which should be noted, are used to indicate types of products.

H—High roll top desk.

L—Low roll top desk.

C—Special roll top desk.

S—Flat top desk.

D—Double flat top desk.

K—School-teacher's flat top desk.

F—Flat top typewriter desk.

DF—Double desk with one side arranged for typewriter.

PF—Flat top desk with typewriter in place of right-hand bank of drawers.

R—Roll top typewriter desk.

B—Bookcase.

RB—Revolving bookcase.

P—Coat tree.

X—Inkstand, single.

DX—Inkstand, double.

M—Letter tray.

MC—Map and chart case.

T—Table.

U—Umbrella stand.

W—Wardrobe.

As most products of this company are made both with sanitary legs and with drawers to the floor, sanitary designs are indicated by the prefix of the letter O. Styles of desk or bookcase under each type are indicated by a serial number. The length in inches follows the style number. Then comes the type symbol and finally the number of the catalog (serially numbered) in which the desk is described.

Take, for instance, the symbol O3360DF8. To one who is familiar with this system it is at once apparent that this refers to a sanitary desk, style 33, sixty inches long, a double desk with one side arranged for a typewriter, described in catalog numbered 8.

This is not at all a complex system. It takes only a short time to become thoroughly familiar with it.

Obviously, it tells all that is necessary in order to identify any product and thus prevents indefiniteness, as well as saves a great deal of time.

121. *Use of numbers in symbols.*—Size is best expressed and most easily remembered as a numeral. A series of arbitrary numbers is suggestive of the relative not the actual size. It is better, if possible, to use some characteristic dimension. This is more descriptive and allows the adding of new sizes in their logical order without disturbing the existing symbols. Where arbitrary numbers are assigned a sufficient number of blanks should be left to cover all future additions.

In addition to preventing misunderstandings, symbol systems save a great amount of writing on drawings, requisitions, stock records, and time cards; many managers consider this saving in clerical labor as their greatest advantage.

122. *Symbols for manufacturing.*—Symbol systems may be roughly divided into four classes covering:

1. Finished product.
2. Parts.
3. Operations.
4. Tools and machines.

The usual method of symbolizing the finished product is to divide it into classes; to designate each of these classes, if there are less than 26, by a single suggestive letter; and to represent the different members of the class by consecutive numbers. Thus a certain line of presses may be grouped as follows:

Class B—Bench Presses of all kinds.

Class C—Cutting, Horning and Wing Presses.
Power, Single or Double action.

Class D—Drawing and Deepening Presses. Power,
Single or Double action.

Class E—Embossing and Coining Presses. Power, Toggle or otherwise.

Class F—Foot and Hand Presses—Lever Pendulum Screw, etc., Single or Double action.

Class G—Gravity Presses, Drops, with Hand Foot Crank Belt over Roller Lifter.

Class P—Punching and Shearing Presses, Power Throated.

Class S—Stamping and Bending Presses, Power Double-crank, Composite frame. Throated or straight, upright or inclined rectangular or round beds.

The individual presses are C1, C2, C3, E1, E2, W3, etc.

A better method wherever possible, however, is to make the symbol descriptive, as are the chemical symbols, by combining a number of their elements. Thus there will be fewer symbols to remember and anyone can pick out the meaning of the combined symbol even if he has not seen it before. The Derby Desk Company's system is of the descriptive kind.

There are two systems of designating parts. The older one takes the finished model and numbers its parts consecutively. If P1 is the model symbol, the part symbols would be P1-1, P1-2, P1-3. The great disadvantage of this system is that with the growth of interchangeable parts the same part used in two or more machines will have two or more symbols. This makes stockkeeping difficult and perpetuates one of the very faults it was designed to eliminate, the confusion of common terminology. Its advantage is that the trade in ordering repair parts will not confuse parts of different models.

The newer method aiming at fewer drawings, alteration of existing patterns whenever possible and the

development of interchangeable parts, takes the part as the basis and builds up the final model. This second system is directly opposite in nature. The parts are grouped according to their similarity, not their use. All bolts, for instance, would be classed together as bolts and designated by the symbol for bolts, followed by such particulars as material and size. This greatly facilitates stockkeeping, and throws the responsibility of making up a correct bill of material for each manufactured article on the designer, where it belongs. In order to prevent confusion the drawing and the pattern should be designated by the same symbol as the part, and this number should be stamped on the part in some way to facilitate work in the factory and to make it possible for customers to order duplicate parts without consulting a catalog.

123. *Standard routine.*—Time study is one way of developing a standard routine. Evolution is, however, the more common method in practice to-day. Evolution approaches the problem not from the standpoint of the work to be done but of the best previous performance, and is more or less unconsciously followed in all businesses. One man in a shop will turn out more work than his neighbor. His method is studied and made the standard for the shop. By and by, some one else, perhaps a foreman, will discover a short cut and so, little by little, the efficiency increases. An ambitious clerk works out a new way of handling credits which the office adopts. The sales manager collects suggestions from his older salesman, which he tries out and finally crystallizes into a manual, the codified best-way-of-selling. The difference between standardized and common practice is that where conditions are standardized each advance is at once officially recorded whereas, in every-

day life, advances are recorded by tradition alone and so are likely to get lost.

Harrington Emerson has graphically compared standardized practice to a ratchet which holds everything gained so far without in any way retarding further progress. The business executive can stop a moment to reflect and rest without letting the business fall. One man starts where his predecessor left off instead of spending his time re-doing a problem which has already been solved. It is the ratchet motion.

124. *Steps in developing standard routine.*—The first step in establishing a standard routine is to find out exactly what the present procedure is. One way to get this is to have each employe write out exactly what he does, together with any suggestions he may wish to make concerning the improvement of any phase of the work. Some of the older men will doubtless object to giving away their secrets, but eventually they will get in line to keep in the good graces of the firm. The next step is to work the best of these up into a manual to serve as standards until something better is evolved. This is only preliminary, but it must be done whether standards are to be developed by time study or evolution, the better method usually being to employ both plans. The introduction of a standard routine is often delayed unduly while the standard is being perfected on paper, and thus much of the advantage of the standard is foregone and its ultimate perfection delayed. The quickest way to develop a standard is to place it in concrete form before the office, shop or sales force. The worker must then agree or disagree; his test will prove it right or wrong. In either case, his ideas are focused for the use of the office.

It is also advisable to profit by the experience of

others. Mr. Gilbreth gave the following testimony before the Interstate Commerce Commission:

We furnish our men with eighteen bricks in what we called a pocket for the want of a better name. That pocket consists of a tray with four slats, two this way and two that way for handles. I got the idea for that from Mr. Taylor and Mr. Gantt in the matter of handling pig iron at the Bethlehem Steel Company. They found after long experiment that 92 pounds was the best unit for handling pig iron. If that is true of pig iron, and the laborer makes no use of the material he carries, it must be true also of brick. So we arranged to have the pocket that would best handle 92 pounds of brick.¹

Care must be exercised, in adopting others' standards, to make sure that conditions are the same or to make due allowance for local conditions. Differences in machinery, hardness of metal and such apparent details will entirely change the amount of work which can reasonably be expected.

The development of standards both of measure and of routine is one of the principal duties of the technical societies. For example, the American Street and Interurban Railway Association in 1906 adopted and recommended for use by its members a standard code of rules for the government of conductors and motormen. The American Railway Master Mechanics' Association recommended a standard apprenticeship in 1898 which they have amended and reiterated from time to time. The American Institute of Architects in conjunction with the Master Builders' Association have adopted a uniform building contract. There is a society specially organized to promote uniformity in methods of testing cement.

¹ Brandeis, "Scientific Management," p. 27.

125. *Value of printed record.*—However the routine is developed, it should at once be put on paper. The rapid increase of civilization since the introduction of printing as compared with that of the centuries before shows the efficacy of the printed record. The record of business routine operations is known as a manual, and it is surprising to see how universal is its possible use. In the office, the correspondence manual contains a series of carefully worked out paragraphs covering routine questions, by the use of which the correspondent can greatly reduce the time necessary to handle his mail. The manual of the Long Island Railroad contains 773 rules covering the duties of different employes, how to make up trains, the rights of trains, how to signal, etc. Similar codes are in force on all railroad systems. Most department stores have their "Book of Rules." The "Standard Book" of the Westinghouse drafting room contains twenty-four drawing dictionaries which specify: lines to be used; letters and figures; methods of sectioning; mechanical features, such as size of sheet, position of title; element charts; illustrations of the elements of their various machines; illustrated index of terms used; digest of the 400 pages of circular instructions issued from time to time; and example drawings and abbreviations.

While the material in the manual is the important thing and not its form, nevertheless it is convenient, where the firm is large, to publish the manual as a loose-leaf book and small enough to slip into the pocket. Thus changes may be made from time to time without re-publishing the whole book and because of its convenient form it can be carried around and thus be at hand when required. It should be fully indexed to facilitate its use. In small companies it is convenient

to typewrite, mimeograph or blue print the manual. An even simpler method is a scrap book in which are pasted copies of each specification for material and each letter of instruction which the office issues. This is not as convenient as the other forms because the material is not properly classified, and duplicates cannot be issued without considerable trouble.

CHAPTER VII

STANDARDIZATION AND WAGES

126. *Goal of every producer.*—One of the chief differences between machine-made and hand-made goods is that the latter possess greater individuality. The recent revival of the handicraft trade shows what a strong hold this quality in a ware has upon the consumer. Nevertheless, when the producer of a hand-made article finds that competition is threatening his market he begins the standardization of his product. He may first establish a definite brand for his article, by which method he hopes to impress a community with the fact that his goods possess a standard of purity or some other quality which is highly desired in the market. Failing to monopolize the trade by this method, he may attempt to hold his market by a reduction in the cost of making his goods. If his goods are made altogether by hand, the costs will be lessened by turning out a larger product than before in a given period of time. This he can do with the best results if he can make a standard type and can confine himself to the making of it over and over again. This is standardization, but it cannot be carried very far under a system of handicraft labor, for the working power of a man is limited. But with the addition of steam power and machinery to the workman's shop, the question of being tired does not apply to either the engine or the tools. The more work these can be made to do, the higher will be the productive capacity of the shop. But before he can determine what

the highest efficiency of a shop is, he not only must know his own endurance and skill, but must determine what the possibilities of his machine are under the best conditions.

127. *Three factors conditioning output.*—The three principal factors conditioning the output of both man and machine are speed, the character of the material, and the tools. It is therefore necessary to determine what particular speed, what particular grade of material, what particular quality, what particular kind of tool can all be united in producing the greatest amount of goods of a given quality during any production period. When this has been determined for each of the factors, we have what is known as standard speed, standard materials, and standard tools. As the size of the industry increases and the number of men and machines grows, it becomes necessary to apply the principle of standardization¹ to other processes, equipment and appliances. Thus we find standard times for handling the work standard times for assembling, standard office forms and finally a standard wage, which rests upon a consideration of the relations of all those processes which have been standardized to the labor which is necessary to direct them.

The standardizing of a product, a tool, or of a process or of a relation depends upon the removal of as many as possible of the variable or uncertain factors. What may be a standard under one set of productive conditions may be entirely set aside under another because some uncertainty connected with the old standard has

¹In the Santa Fé system of transportation, referring only to the various shops, roundhouses, etc., there are 23,000 operations recognized as standard, with additions being made every year.

been removed. The measure therefore that is used in a factory in determining its productive efficiency, or the efficiency of any part of the productive process, is the lowest possible time in which each piece of work can be completed. This is known as the standard time. A standard time, however, is simply the reduction to its lowest terms of a product which is made up of a number of other predetermined standards. Thus the "standard times" for any shop depends upon the following:

1. "The character and limitations of the existing machine tools.
2. "The introduction and use of high-speed steel for cutting tools.

This will include:—

- a. "The determination of the proper shapes for tools.
- b. "The provision for proper treatment of steel of this character in forging, hardening and grinding.
- c. "The determination of the best working conditions possible, such as cooling agent, etc.
3. "The securing of the maximum possibilities in cutting speeds.

This includes:—

- a. "The careful consideration of the tests already made and submitted by different investigators, giving of course due thought to the conditions existing at the time of the test.
- b. "The adaptation of these records to existing shop conditions and the making of a thorough test in the local shop under the limitations imposed by types of machine tools existing in the shop.

4. "The collection of all production data upon a systematic plan and their arrangement so that they can be used.

- a. "The instruction of the foremen and the workmen as to the results to be expected and how to secure them.
- b. "The insurance that the every day production follows this standard of efficiency."¹

128. *Determination of handling time.*—Many of the standards pertaining to materials, machines, and speeds belong for their determination within the province of the engineer. As an illustration of how far standardization has gone as a matter of business policy, the adoption of standard times for handling the work and for assembling the parts presents the most recent development. Handling the work is divided into four parts and a standard time determined for each division. These are the times required to handle the parts, to "set up" the job, to machine the work and to remove the work. Only one of these will be illustrated and this for the purpose of showing what commonplace and simple activities are receiving the closest scrutiny of the progressive manager.

The time required to handle the parts in any large factory is an important consideration. The loss of much time may result from the lack of proper facilities, and methods, and from a tendency of workmen to kill time. The proper facilities to-day for the handling of heavy goods especially would be pneumatic or electric hoists connected with an overhead single track which serves a number of machines. The method of handling work has been standardized by having certain operations, such as the piling or placing of parts, done in the

¹ "Profit-Making Management," by C. U. Carpenter, page 83.

same manner and place each time the operation is performed.

In the handling of light work there are various operations that should be given close attention; for example, it is best for the stock to be carried in boxes of the standard size. This reduces the number of sizes needed to the minimum.

A check upon the workman may be effected by carefully selecting the place where the box is to stand. Very often a low, strong table can be used to good advantage. This table at once standardizes the spot where the stock shall be placed, and the fact that the workman becomes accustomed to reach for his stock always in the same spot adds appreciably to the speed of the handling. The conditions are now ready for a test to be made in order to determine the least time necessary to do the work. A series of stop watch tests upon an active workman will serve as a basis for a standard time for handling this part of the work. It is well, however, to check this test by other trials performed by an expert "tester." The latter is really a standardized laborer.

The establishment of a standard time for assembling work has practical difficulties connected with it which are far more difficult to overcome than in the case of machine standards. The human elements of judgment and skill are more difficult to determine than the peculiarities of a machine. In most factories the workmen dislike to have their best speed known to the management, for it often means a relative decrease of pay. The only general rule that can be applied in the determination of the standard times in this work is to separate the assembling operations for any particular job into as small a number as possible. If a workman can be confined to three or less operations the problem is

much simplified. But where the assembler has as many as ten different operations on a particular part, the solution becomes highly involved. The character of the difficulties put in the way of the determination of this standard time indicates that the manager should lend his energies to solve it. "The waste of time," says Mr. C. U. Carpenter, in his excellent book on "Profit Making Management," "in the ordinary assembling department of the average manufacturing concern is almost beyond belief."

A test made by Mr. Carpenter on assembling work shows what can be done in effecting economy in this direction. Taking advantage of a strike in the polishing department, a system of determining the standard times of assembling was adopted with the new men. Twelve expert polishers were put in charge of instructing sixty-two green hands. A partial analysis of the work after a few weeks showed that a reduction of 40 per cent could easily be made in the rate paid and still provide the men with a good wage. In three weeks time it was found possible to put the entire force upon piece work at the reduced rate. Being assured that no further reduction would take place the men were urged to do their best. The records showed that at the end of a period of ten weeks, the average earnings exceeded \$5.50 per day whereas under the old system it was only \$3.00 per day. The work itself increased so materially that at the end of six months the actual records showed savings in the pay roll in this department amounting to over \$55,000 per year.

The relation of standard times to other features of organization is very close and vital. The determination of the "shortest time" in which a job can be done is the first place to begin in establishing a wage system; and

what standard times mean to the cost system has only to be mentioned, to be realized.

129. *Principal elements in getting efficiency.*—The methods by which greater efficiency is gained are sometimes called “betterment work.” The principal elements that have been treated of so far in previous chapters are: (1) the centralization of manufacture at shops best fitted by reason of location or otherwise for doing the work; (2) standardization of parts, of tools and of operations; (3) supervision of materials, tools, and methods and the planning and designing of devices and tools to help labor and machines in reducing delays. There still remains a fourth element for consideration—the element which relates to the reduction of labor costs by the application of a system of wage payments.

130. *Wage systems.*—In determining the standard time of any process involving the combined work of machines and men, the many difficulties that arise are largely due to the “human element.” Some of these difficulties have been mentioned and among them is the difference in men’s capacity to work. Therefore, before a standard time can be adopted for a particular operation, it must first be determined what the capacity of the average man is. If the standard time is based upon what the best man can do, and the average laborer is expected to reach that standard, the practical failure of any wage system based upon it is assured.

Standards are of little use unless they can be used as measures in comparisons. A standard used in a system of wages must be used in effecting two comparisons. First, the working efficiency of each laborer at different times must be compared; second, the working power of different laborers must be compared. By a consideration of these two comparisons, the manager is en-

abled to determine what the individual laborer is capable of doing from day to day and what he ought to do as compared with the other laborers who do the same grade of work. Having determined what efficiency is necessary to produce his goods at a certain cost in order to make the required profits, the necessity devolves upon the manager of keeping the rate of production up to the required standard. It is at this point that the question arises as to how the laborers may be held to the standard efficiency. The machine asks only as its return the repairs and renewals necessary to keep it going. The laborer, on the other hand, seeks as his return all that he produces. The nearer he thinks he is approaching to this demand, the greater is the stimulation to work. It is therefore not always the high wages that determine the labor efficiency of a factory but the system by which the wages are determined and paid.

131. *Systems of pay.*—The most prominent systems of pay in the United States are the day-work plan, the piece work plan, the premium plan, the differential plan, and the bonus plan.

The first method is usually employed where special conditions prevail. Thus it would be fatal to adopt a system of wages in a department where great care and accuracy were demanded whereby the workmen were stimulated to produce more but inferior work.

The piece work system in its simplest form provides for the payment of work by the piece. It was at first hailed with enthusiasm by the worker, but so many abuses crept into the system which proved hurtful to the piece-worker, that it is now generally regarded by working men with suspicion. One of the abuses is the practice of cutting rates when the men begin to earn high wages. The mischief of cutting rates is very largely

caused by poor judgment in establishing the piece-rate in the first place. The standard prices or the standard times were not based upon scientifically determined data, but upon some such basis as the "best previous records," an "ordinary try-out," or the foreman's estimate. The laborer generally saw that by working harder he could increase his income by several per cent over the old rate, but this generally led to a similar per cent cut in the price. Thus the laborer was left working very much harder than a few days before with a return in wages no larger than formerly.

With the day work plan and the piece work systems as a basis other methods have been made possible by the more accurate determination of standard times. The bonus system is one in which there is a definite time set for the accomplishing of a task and which provides for the payment of an extra sum of money if the work is completed within this time. This is a modification of the day-work plan, whereby a definite task has been more scientifically determined in regard to the time necessary to accomplish it. The principle involved in this system as in the other is to establish a fixed rate of pay per day so that if the laborer turns out less work than is demanded by this standard he will be insured at least of a living wage. On the other hand, if he comes up to the standard set or does more, he will be paid a proportionately larger wage. The Halsey System, named after its inventor, is an example of a wage system formulated along these lines.

A standard time is set for accomplishing the work, but if for some cause beyond the control of the workman that piece of work cannot be done in the time set, the laborer gets the wage previously agreed upon. It is also understood that this rate of wages will not be

cut. Supposing that the man was working on a six-hour day basis, he would be expected to finish in six hours and would be paid 25 cents an hour or \$1.50 per day. If he did the work in five hours he would get a part of the wages which he had saved by finishing an hour sooner. If the proportion agreed upon is one-half he would then get \$1.37½ for the five hours' work—namely, five hours' work at 25 cents plus 12½ cents for the hour he saved. If he does the work in three hours he would get three times 25 cents plus one-half of the wages for the time saved or \$1.12½.

Under this system, therefore, the laborer never fell below the day rate that was fixed and he always had the chance of earning more by turning out more work. This was a compromise between the day work and piece work system which lessened the effects of each. The employer received part of the benefit of the employé's increased output, thus eliminating the incentive to cut the laborer's wages. On the other hand, the workman would not be inclined to limit his output because he wished to do as little work as possible, as under the day-work plan, or for fear that his wages would be cut, which so frequently happens under the piece-work plan.

132. *Taylor differential system.*—Another system is that known as the Taylor differential piece-rate system, after its inventor. This is based on a carefully determined standard time, a careful study having been made of the operations involved and estimates of how long it would take a first-class man to accomplish a given piece of work. If that standard is reached, the workman receives a high rate of wages. If he just falls short of the standard set, a considerable deduction from the day rate is made. This system is only an-

other of the special plans made to suit particular conditions. It could only be introduced into high grade shops where the work is standardized and the men trained by functional foremen. It might be applied where the intensity or the rate of production must be high in order to get the utmost out of the very costly machinery, tools, and so on.

133. *Efficiency system.*—The efficiency system is still another of these plans. Here the time limit is set as in the Taylor system, and if it is reached by the workman he receives a high bonus; that is, the employés are paid by day wages but are stimulated by an additional bonus proportioned to their efficiency—efficiency in this sense being the ratio between the time he takes for the job and the standard or schedule time set for him. The amount of the bonus is determined by a standard table which fixes the percentages of wages for time actually worked that is paid in addition as bonus at any determined rate of efficiency. As applied in the Santa Fé shops this table grants no bonus below 66 2-3 per cent efficiency—that is, below the rate of working at which the man takes one and one-half the standard time for completing his job; from that point upward it allows bonus on a rising scale, which reaches 20 per cent additional to actual wages at 100 per cent efficiency (or the completion of the job in the standard time), and thereafter adds 1 per cent of wages for each additional 1 per cent of efficiency.

Thus it is seen that this system does not punish a man for not reaching a standard and omits the failing of the Taylor system by enabling the men to earn a fair wage if unforeseen difficulties occur. For instance, if a man reaches 100 per cent efficiency, he will receive a

20 per cent bonus; if he falls below or goes above this standard, he will receive less or more according to the following table:

<i>Efficiency.</i>	<i>Percentage of Additional pay.</i>
67%	0
74%	1
80%	3.37
85%	6.17
90%	9.91
95%	14.53
100%	20
110%	30
120%	40

The rate of pay would be as follows:—

<i>Hours' work</i>	<i>Days' work.</i>		<i>Piece-work.</i>		<i>Premium.</i>	
	Daily Wages	Hourly Rate	Daily Wages	Hourly Rate	Daily Wages	Hourly Rate
7	\$1.75	.25	\$1.50	.214	\$1.75	.25
6	1.50	.25	1.50	.25	1.50	.25
5	1.25	.25	1.50	.30	1.375	.275
4	1.00	.25	1.50	.375	1.25	.312
3	.75	.25	1.50	.50	1.125	.37
2	.50	.25	1.50	.75	1.00	.50
1	.25	.25	1.50	1.50	.875	.875

In order to make a further comparison of the various systems, we will assume that the following conditions might occur:

1. The workman does no work at all,
2. The workman does the standard work within the standard time,
3. The workman does all the work in no time at all.

Then under the various systems we have mentioned their pay would be as follows:

	No. 1.	No. 2.	No. 3.
Day-Rate, Piece-Rate, Premium,	Full wages, No wages, Full wages,	Full wages, Normal pay, Full wages,	No wages. Full pay. 50% additional pay.
Taylor,	No pay,	Bonus above normal pay,	Full bonus and full pay.
Efficiency,	Full wages,	Bonus above normal pay,	Full bonus and full pay.

134. *Bonus plan.*—The bonus plan of payment, when combined with methods that determine accurately the shortest time in which a job can be finished, has much to recommend it. In the first place, it is easily understood and can therefore be easily introduced among a body of laborers. It is easily adapted in some form to almost any other system of pay that may be already in existence in the shop. Some managers have found it advisable to extend the bonus plan so as to include the job bosses and the foremen. The plan in this case is to give bonuses to the foremen in case all the men under them earn bonuses. This has the advantage of stimulating the foreman to give immediate and close attention to the inefficient workman. He will either attempt by proper and speedy training to raise his efficiency or drop him from the pay roll.

Thus from the point of view of labor the great purpose of standardizing both as to operations and time is to introduce some system of wages whereby efficiency is increased and stimulated under some method of bonus awards.

Perhaps the greatest discovery which the modern manager has made in his studies and attempts to solve his labor problems through better wage systems is the fact that the efficiency of the whole organization is the efficiency of the individual workman and that the latter is secured and stimulated by giving him a wage proportioned to his production.

CHAPTER VIII

CONTROL OF LABOR

135. *High cost of man power.*—The difference between the costs of man power and mechanical physical force is tremendous. Large electric power companies quote prices of 10 cents to 2 cents per kilowatt hour. And prices as low as .5 cents have been known where electric current was used in very large quantities.

A man power has been estimated to be equal to about one-tenth of a horse power. On the basis that a kilowatt is 1.34 horse power and that labor is paid 15 cents an hour, it is figured by a prominent engineer that human physical force is from 11.2 to 2.24 times as expensive as electro-motive force—the force in each case being purchased from the generator.

The most significant factor in the development of the American nation whether we look at it from the political, religious, social or economic side is the high cost of man power. No nation is likely to advance with equal rapidity along all lines at once, for that element in a nation's life matures most quickly which calls to it the strongest men. Business, therefore, in America has been able to overshadow everything else because it could pay the price.

As a converse proposition, it might be stated that business can pay the price because it has drawn to itself the highest type of man power, the men who think. Thinkers and leaders in the economic world have seen the advantages of replacing, where possible, the high priced physical human labor by the cheaper

natural forces. Thus business itself has been modified from within by the same force which made it the leading factor in our civilization; the high cost of man power has compelled business men to use steam, electricity and water power. Few managers to-day need to be told that the most efficient way to utilize man's physical strength is the employment of it in the control of machinery by which the work is actually performed. The locomotive engineer or the man who manipulates the many-tonned trip hammer controls forces thousands of times greater than they could generate personally.

But there comes a time in all progress when the advancement in a particular direction is slowed down and when every increment of gain is made at greater and greater costs. This is the case at present in the basic industries. Every machine needs a man to tend it and thus there is a point below which the substitution of men by machinery cannot go. Realizing this, a few progressive managers are looking in new directions for the saving in or at least the more economical use of this high-priced man power.

136. *Waste of human power.*—When the chief concern of the manager was to get out his product, no matter what its quality, of what use was it to speak of a science of labor control? He needed men—the stronger the better. The industrial frontier was advancing by leaps and bounds and men were needed. Any kind would do. The manager seldom questioned closely to see if he was “the man for the job” when he employed him; and when he dismissed an employé he assumed that the employés failure was due to general incompetence. That the man might simply be a “misfit” never occurred to the manager.

The frontier days of business are gone. “Big kill-

ings" with primitive methods are now as scarce in business as in hunting. It is time that some of the energy of investigations be turned upon the question of labor adjustment—the more economical use of human power. Consider the efforts of our schools, colleges and private laboratories to solve questions pertaining to mechanical and electrical engineering; the struggle to produce mechanical refinements and power saving appliances; the tests of coal, oil and other fuels; the gauges for measuring the use of power—and then consider the small amount of effort used in investigating the use and conservation of labor power!

Some years ago, late in 1907, in a very large machine shop we utilized the month of shut-down, when 90% of the employes had been laid off, to relocate 75% of the machines so as to facilitate, expedite, and cheapen production. Nothing was done as to personnel, although it is obvious that an organizing skill, that could install in poor locations three-quarters of the machines, would also, to at least some extent, fill the personal positions badly; and so it proved, for when business started up again there were a succession of demoralizing and costly strikes.

Investigation shows that in most industrial plants at least three-quarters of the men are badly placed, which does not in the least mean that the men are undesirable. An intelligent readjustment and reassignment of positions without discharge may improve the efficiency of a plant 30% to 40%.

Efficiency tests and analysis, tests of operation, not of organization, always show, among the day wage-earners in the same plant, individual variations between 30% and 120%; the extremes of actual test on a whole month's work being 7% and 210%. The 210% man was evidently, by accident or choice, extremely well fitted to his work; the 7% man was equally, by accident or choice, extremely poorly fitted to his work. Operation can gradually, in the course of months and

years, eliminate men of low efficiency, and by experiment and test and successive discharges replace them with men of higher efficiency. In this way it is possible in the course of three or four years to bring the efficiency of operation up from 50% to 100%, but as an element in organization it is possible by predetermination of aptitudes to curtail the time very greatly and in the end secure a better personnel.¹

137. *Periods of rest and relaxation.*—While it is true that experiments have shown that a man power is equivalent to about one-tenth of a horse power, there are elements in calculating labor power that do not need to be considered in determining mechanical efficiency. A man is spending his own energy first for himself and then indirectly for the benefit of the manager. When the fatigue point is reached in a man, the consequences of continued labor are something more than slackened production; he is robbing himself of his health—the storage battery of his working power. It is at this point that employers of labor need more knowledge of the relationship which should exist between the periods of rest and relaxation for “different volumes of load” carried by the laborers. They should be able to see how to adjust these periods in the predetermination of industrial operations so as to obtain the maximum of work without exceeding the “elastic limit” of the employé. It was along this line that Mr. F. W. Taylor conducted some of his most important investigations. He not only recognized that the working-time units must be separated from the resting-time units but he first pointed out that different kinds of work require different percentages of rest depending upon the kind and nature of the work done.

¹ Harrington Emerson, address before the Efficiency Society, Annual Meeting, 1913.

Although little work has as yet been done along this line, there are evidences of much interest in the determination of a fair day's work. Time studies, fatigue studies, work records, etc., are growing quite common and their results all bear on the determination of a fair day's work.

138. *A fair day's pay.*—Closely associated with a fair day's work is the question of a fair day's pay. They are the two sides of the same shield. The employer sees one side; the employé the other. It will, however, be a comparatively simple thing to determine a fair wage when we know how to estimate the labor involved. Yet there are other elements to be considered besides the amount of energy expended by the laborer, and the rate per day he is paid by the manager. These are (1) steadiness of employment, (2) permanency of employment and (3) future prospects.

Although American business men proved to the world that high wages did not necessarily mean high costs of production, it seems difficult for many men to see the application of this principle when they are brought face to face with the question of labor costs in their own store or factory. They see the "wages paid" but forget the "output." Wages paid are high or low depending on the size of the output; "wages received" are high or low in proportion to the time which the laborer takes to do the work. The combination of low wages given with high wages received would prove to be ideal.

139. *Illustrations.*—CASE I.—Assume a workman turns out ten units of a given product for which he is paid \$3.00 a day. The upkeep, interest and depreciation of his machine amount to \$6.00 a day. The factory overhead cost, distributed either on the man

or the machine, equals \$1.50 a day. The material required for the ten units costs \$7.50. While this is purely a supposition, the proportions are typical. The cost is \$1.80 for each piece. In the form of a simple equation the results work out as follows:

$$\begin{aligned} \text{Labor} + \text{Machine} + \text{Overhead} + \text{Material} &= \text{Cost} \\ \frac{\$3.00}{10} + \frac{\$6.00}{10} + \frac{\$1.50}{10} + \$0.75 &= \$1.80 \end{aligned}$$

This equals a piece rate of wages to the workman of 30c. If he can be induced to increase his output, the more he makes the cheaper becomes the cost.

CASE II.—If he earns \$4.50 by increasing his output by one half, the cost per unit of product drops to \$1.55.

$$\begin{aligned} \text{Labor} + \text{Machine} + \text{Overhead} + \text{Material} &= \text{Cost} \\ \$0.30 + \frac{\$6.00}{15} + \frac{\$1.50}{15} + \$0.75 &= \$1.55 \end{aligned}$$

CASE III.—If he earns \$6.00 by doubling his output the cost drops to \$1.42½.

$$\begin{aligned} \text{Labor} + \text{Machine} + \text{Overhead} + \text{Material} &= \text{Cost} \\ \$0.30 + \frac{\$6.00}{20} + \frac{\$1.50}{20} + \$0.75 &= \$1.42\frac{1}{2} \end{aligned}$$

CASE IV.—If, however, he cannot be induced to exert himself except by a higher piece rate, say 35c each, it will still be real economy to allow it. Though the workman would earn the high wages of \$5.25 and \$7.00 per day, the original cost of \$1.80 would have fallen to \$1.60 and \$1.48½, respectively.

CASE V.—Suppose, in Cases II and III, that in order to increase the output 50 per cent it is necessary to increase the office force and supply store room clerks, etc. This makes the overhead rise to \$2.00 a day. The cost would, nevertheless, drop to \$1.63¼ and \$1.50, respectively.

$$\begin{aligned} \text{Labor} + \text{Machine} + \text{Overhead} + \text{Material} &= \text{Cost} \\ \$0.35 + \frac{\$6.00}{15} + \frac{\$2.00}{15} + \$0.75 &= \$1.63\frac{1}{3} \\ \$0.35 + \frac{\$6.00}{20} + \frac{\$2.00}{20} + \$0.75 &= \$1.50 \end{aligned}$$

If, however, which is the more probable supposition, the rate is made 25c instead of 35c the saving would become even more marked.

$$\begin{aligned} \text{Labor} + \text{Machine} + \text{Overhead} + \text{Material} &= \text{Cost} \\ \$0.25 + \frac{\$6.00}{15} + \frac{\$2.00}{15} + \$0.75 &= \$1.53\frac{1}{3} \\ \$0.25 + \frac{\$6.00}{20} + \frac{\$2.00}{20} + \$0.75 &= \$1.40 \end{aligned}$$

CASE VI.—Or suppose a bonus system is adopted; the man continues at \$3.00 a day, but is allowed 50 per cent of the time he saves as a bonus. This distributes the cost as follows:

Illustration (a) where there is a 50 per cent increase in output.

$$\text{Labor} + \text{Machine} + \text{Overhead} + \text{Material} = \text{Cost}$$

$$\$0.25 + \$0.40 + \$0.13\frac{1}{3} + \$0.75 = \$1.53\frac{1}{3}$$

Illustration (b) where there is a doubled output, $\frac{\$3.00 + \$1.50}{20} = \$0.22\frac{1}{2}$ per piece.

$$\text{Labor} + \text{Machine} + \text{Overhead} + \text{Material} = \text{Cost}$$

$$\$0.22\frac{1}{2} + \$0.30 + \$0.10 + \$0.75 = \$1.37\frac{1}{2}$$

It will be noticed that the machine and overhead charges are constant, irrespective of output. If a \$3.00 a day man idles for half an hour the loss is not only the 18 3/4c he receives, but the $\$7.50 \div 16 = 47c$ loss in machine and overhead. If the man is on piece rate, there is no loss in wages when he slows up, but the 47c machine cost is still there.

140. *Special factors influencing wages.*—The amount of increase of wages over the customary wage scale necessary to induce a man to appreciate his job and take care of it must be found by trial. If it is not ample, the men will decline "to be worked" as they

express it, and the plan fails. If it is too much, the men become irregular and in many cases dissipated. It has been found that it is not well to let the average workman increase his earnings too rapidly. If the happy medium is attained he becomes steadier, lives better and accumulates property. The proper rates of increase given by Mr. F. W. Taylor are:

Light work calling for no special fatigue such as ordinary shop practice—30 per cent.

Ordinary labor calling for strength and severe bodily exertion and fatigue—50 to 80 per cent.

Special skill or brains with close application but requiring no bodily exertion—70 to 80 per cent.

Skill, brains, close application and extreme rack and bodily exertion such as running a steam hammer—80 to 100 per cent.

Other industrial engineers agree approximately on these increases and Mr. Taylor pertinently remarks that they are not quantities to be theorized over by boards of directors, but are facts determined by costly experiments.

The workman is interested in his total day's pay and not the unit in which it is figured. The standard illustration of this is the case of the ore shovelers at the Bethlehem Steel Works. They were paid 3.2c per ton for unloading iron ore from cars. Pittsburgh companies were paying 4.9c per ton for the same work. Hearing of this the Bethlehem gang all quit and went to Pittsburgh. The conditions there, however, were such that they could not maintain their output, and their total earnings fell off. Within four weeks the entire gang was back at Bethlehem, glad to work at the lower rate, since their total earnings were greater.

The wage system must be so drawn that the self in-

terest of the workman and company interest will correspond. There should be no confusion of the issue with hypocritical sentiment. Both the boss and the workman are working for their own interests; and they work together because they can thus best further their own ends. The simplest way to get a man to exert himself is to make it his personal interest to do so. Each man must be treated as an individual and rewarded in proportion to his individual exertions.

141. *Wages the chief incentive.*—The amount of money paid a man for his work is more important from the manager's point of view of business policy than the actual payment which may embrace many things beside money, for example, free lunches, use of gymnasium, libraries, etc. But the money a laborer receives is his to do with as he pleases. It is this bit of absolute possession that appeals to every man. Therefore, it is a wise manager who lets as much of his labor policy show in the wages envelope as possible. It was this knowledge of human nature that led Napoleon to counsel his brother Joseph, "The first thing to be done is to allow no arrears in the pay of your forces." For a manager to put in industrial betterments, medical service, etc., etc., before he has worked out a satisfactory wage system is simply to waste his efforts.

142. *Importance of short-period records.*—Men love independence and real cash gives it. But having established a working-wage system it is well to apply all the aids available to stimulate the laboring force to high endeavor. Modern psychology is furnishing many suggestions along this line. Among them are two, worthy of special mention.

Trainers of bicycle riders discovered that the records made when riding against time were poorer than when

the man was accompanied by a pace maker. More than that he showed less exhaustion when making the paced record than when riding more slowly. The presence of the pace maker did it. Man needs society to do his best work and if he has some means of comparing his accomplishments at different stages with a known standard he can call on his reserve forces without the same fatigue which goes with a solitary performance and a slight knowledge of the progress he is making. The ultimate goal is usually too far to offer the stimulus necessary to high accomplishment. This principle has been applied by some managers in allowing their bosses to post a record from time to time during the working day showing each man just what he is accomplishing.

The effect of a record of this kind has been measured in the laboratory upon a university athlete and it shows that great gains in endurance are made without evil effects. A college man was set the task of testing the strength of his hand by gripping a contrivance which registered the force exerted as he opened and shut his hand. His first set of performances were completed with absolute exhaustion. Later on under exactly similar circumstances he was given another test, but now he was provided with a record of each effort showing just how much he exceeded or fell below his previous record at that point. The result showed that this extra stimulation raised his efficiency over 33 1-3 per cent.

The best example in business of capitalizing this spirit of competition or emulation inherent in all men is seen in Mr. Gilbreth's methods of handling his bricklayers. At regular periods the accomplishment of each man was posted alongside of the standard requirements.

143. *Pleasurable surroundings.*—Another psychological factor that plays an important part in the

efficiency with which men work is the element of pleasure. Buoyant spirits and pleasurable thoughts have a decided effect on the physical wellbeing of man just as they have upon his temperament. The heart works better and the circulation of the blood is more free. The basis of good nutrition and health is affected directly.

On the other hand, fear contracts the blood vessels and the flow of the blood is checked. The close connection between this mental state and the physical condition is strikingly shown in the slang phrase "cold feet." Fear lowers the working ability of man. A girl who worked with her back to the gangway beside which her machine stood was about to be discharged because her work was not up to the standard in quality or quantity. The foreman, however, decided to watch her. He found that every time a truck or box was hauled behind her she involuntarily started and slackened her pace. The fear of passing trucks was the cause. She was placed in a quiet part of the room and there became the most efficient employé in that department.

144. *Chilly surroundings develop fear.*—But if fear causes "cold feet," the reverse of the proposition is just as true. The full effects of warm and hygienic surroundings are not fully appreciated until the influence which these things have upon the mental condition of the employés is seen. Warmth of body reduces the tendencies to fear and dread. With these gone, suspicion and conniving diminish also. The manager's problem of overcoming the "discontents" of his factory, shop and office is thus in part solved.

This is not offered as a panacea, but emphasis has been put upon this point because the influence of in-

dustrial betterments upon the efficiency of the worker would be little indeed if it stopped with the physical effects produced upon the bodies of the men. The man whistling at his work is more efficient than the same man shivering over his task. The philosophy of industrial betterment rests on the fact that the body and the mind act and react in harmony.

145. *Stimulating self-interest.*—The pay envelope does not draw to itself all the lines of self-interest which determine a man's attitude toward his work. Employes are interested in their records as workingmen. If a man does good work he is stimulated to repeat it or to surpass previous efforts provided he is duly credited. Nothing is more disastrous to individual effort than to elevate the shirk and overlook the industrious man. The management must use some method whereby the individual's work is not merged with the mass and lost sight of. But to treat men individually, the work must be carefully allotted and an individual record kept. This method has two good effects: (1) It assures the workman of a fair deal; (2) it becomes the basis of eliminating poor men. The manager can keep tab on his foreman's appointments, and thus assure the workman that his work is constantly under review in the head office. If the manager or superintendent wishes to take advantage of this, he can refer to these records and whenever he sees an opportunity to praise an employe he can walk through the shop or office and by casually greeting the man and referring to the particular praiseworthy accomplishment he can in time bind all the good men to him in interested loyalty.

146. *Checks against injustice.*—Furthermore, workmen's records become vital aids in helping to do away with jealousies and injustices attendant on promotions.

It forces the foremen to depend upon some other principle than consanguinity, the "soft-soap grip," or petty tribute, in making promotions. They know that their recommendations must stand the test of recorded efficiency. A manager who suspects his foremen of "playing favorites" can compare their recommendations with the records of other men entitled to consideration. Without removing the foreman's power of promoting a man he can call him to the office and say, "Smith, I understand there is to be a vacancy in your department." "Oh! Yes," says Smith. "Well," says Mr. Manager, "we have several good men down there; let us look over their records." Now the manager knows that Smith intended to recommend a worthless cousin for the job. Such an appointment would hurt the discipline of the department as well as cripple its productive efficiency. But he does not want to curtail the power of his foreman. So they look over the record cards of the men. The cousin's record stands out in bold contrast to that of the good men working by his side who know how incapable he is and of his relationship to the boss.

The manager does not counsel his foreman, but the latter knows that he will be held responsible for this appointment. If he were willing to take the responsibility, the manager could not object until the result of the foreman's appointment showed in the foreman's record. Smith does not recommend his "cousin" for the position and every man in the department is stimulated to do better work because he feels he is going to be judged by his record and get a fair deal.

147. *Elimination of the unfit.*—The second use to which a record may be put is the gradual elimination of the inefficient and increasing of the permanent staff. It

substitutes exact data for impressions and other intangible influences where men are to be laid off. On this point Mr. Gantt says:

Some years ago it became necessary to lay off about ten molders in a foundry. The superintendent sent for the record of the men and made up a list of men to be laid off. There was great complaint, in which the foreman joined, that the wrong men had been selected and that some of these men were the best workers in the shop. The superintendent invited an inspection of the records, which the foreman had never been willing to pay any attention to before, with the result that everybody was satisfied and the efficiency of those remaining soon showed a very marked improvement.

148. *A typical case of the use of records.*—It is perhaps natural that the railroads should be foremost in developing systems of discipline for their employes. Slackness in railroad operation may result in death, as well as in loss of profits. The old system of discipline by suspension from duty has been quite generally displaced by the system of "discipline by records."

President H. H. Vreeland in describing this system as applied to the Metropolitan Street Railway Company, which employs 15,000 men, said that the whole force practically renewed itself every two years before the new methods were adopted. There were not fifty men who had been with the company five years. Division superintendents could discharge men whom they had never seen and the idea that a man might offer a defense never suggested itself. No account was kept of a man's discharge and he might be hired again in a few days. Soon after the record system was installed improvement in the conduct of the men became marked. They felt in closer touch with the management and knew that all had an equal chance, for although their

errors were noted they knew their virtues were recorded as well.

149. *Look for the particular bent of the business.*—Every business has a bent peculiar to itself. The attitude of the laboring force is controlled by it. A method of control to be effective must conform to it. For example, the superintendent of a large screw works found difficulty in getting the children who sorted the screws to do a fair day's work. Various modifications of piece and day work wage systems were unsuccessful. Finally he hit upon the thing peculiar to his shop. He found the children were not interested in their wages. These they surrendered to their parents. Accordingly, he dropped the "envelope idea" and assigned each child a daily task which when finished would permit him to go home. This plan succeeded at once. The play time of the children was their own and they prized it highly.

Another concern found it necessary to break away from the usual methods of paying its salesmen a commission on the basis of their total sales. In order to induce them to maintain prices and to push the more profitable lines the salesmen were paid a commission on the profits of their orders.

The John B. Stetson Company discovered itself to be the victim of a peculiar custom which afflicted its sizing department. The employés here soon changed their occupation and it was hard to keep a steady force. They met the situation by a careful study of the effect of increased pay in the form of a bonus. In 1897 the company offered the man who worked steadily throughout the year 5 per cent. of his total year's wages as a Christmas present. Thirty-five per cent of the men stuck to their jobs. For the three succeeding years the

premium was increased to 10 per cent and the number of steady workers rose from 35 per cent to 80 per cent. In 1901 the bonus went up to 15 per cent and the permanent men increased to 88 per cent. Finally a 20 per cent bonus brought the permanent force up to 99 per cent., where it now remains.

150. *Permanency of employment and pensions.*—The readiness with which a skilled mechanic will sometimes leave his trade in which he can earn \$5.00 a day to enter an office at \$75.00 per month shows how strong is the element of permanency in a job. Small companies often compete favorably for labor with bigger firms because they take care of their workingmen during slack times. The power to discharge a man as a matter of discipline in some large concerns is only resorted to in exceptional cases. The Pennsylvania Railroad Company's records show that 1,350 active employés have been with the company forty years or more; besides there were an additional 1,013 men who, having served over forty years, had retired on pensions.

So strong has the idea of stability of employment grown of late years that hundreds of big corporations have adopted some form of pension system. By this means they hope to increase the attractiveness of the work to their men. Many kinds of old age pensions have been formulated but the commonest forms are those which provide for the retirement of the employe after a certain number of years' service in the company, or at a specified age. The amount of the pension is based on a stated percentage of the average income of the recipient covering a period of years just previous to his retirement. Another, though less common, method is the payment of fixed sums instead of an

amount figured on the actual time of service. The Metropolitan Street Railway Company uses this form of pensioning its men.

The Pennsylvania Railroad Company was the pioneer in establishing a pension system. Their system was the result of an elaborate investigation of the experience of foreign railroad corporations. Several arrangements were considered and the best finally adopted. Since its introduction, January 1, 1900,¹ it has been a model which both railroad and industrial organizations have followed. The International Harvester Company, for instance, has copied it almost verbatim. President Cassatt described it fully in his original announcement.

151. *Hope of advancement as a stimulus.*—So strong is the desire of most young Americans to advance, that many concerns make a practice of holding out glowing possibilities to ambitious men, and at the same time expect them to work for very small wages. Where the firm is sincere in its promises no employé will complain, but it is nothing more than stealing or obtaining services under false pretenses to get the best out of an ambitious man and then let him go when he can be deceived no longer.

One has only to run through the list of "situations wanted" in a morning paper to see how prevalent is the desire of employés to sacrifice money returns if only steady advancement is assured. Out of a total of 1,129 situations wanted in one paper, over 12 per cent of the applicants emphasized the "future." In another paper, 14 per cent of the "commercial help wanted" ads referred to "chances of advancement."

"Don't go outside to fill a vacancy if you can help

¹ See U. S. Dept. of Labor Bulletin, vol. 6, 1901, page 1090.

it," is a policy now generally accepted as the best. However, strict seniority is apt to drive out the men of force and initiative. Accordingly, some firms have broken into the practice of strict seniority by confining its application chiefly to the minor positions, the higher offices being quite free from its influence.

152. *Three examples of promotion policies.*—The Pennsylvania Railroad has laid out its line of promotion very clearly. Out of 160 principal officers, 150 started in the ranks. The ten exceptions are all in the legal departments or in lines of work calling for special experience not obtainable in the organization. The 61 principal officers of the operating department, all of them from the general manager down, started as beginners. Most of the men are hired young with a view to their eventually assuming responsible positions. When first taken on they are put through a regular course of training which makes them familiar with all phases of the work of the department they may enter—traffic, operating, or maintenance of way. After this preliminary training, there is a set line of promotion through which they must advance. In the maintenance-of-way department, for instance, after finishing their training, the beginners become track laborers, road men or assistants in engineering corps. When they have become familiar with all the ins and outs of track construction and maintenance they are made assistant supervisors, assistant engineers, principal assistant-engineers and superintendents, being promoted in the order named. The company not only believes that this system is necessary for the proper perpetuation of its organization, but that it produces the best results and greatest efficiency.¹

¹ *System*, August, 1910, page 150.

The J. W. Butler Paper Company will not put an outsider into a responsible position, even though it might find a man for the time being more capable than some individual in the firm. Mr. J. F. Butler says in explaining this policy:

We do not call in an experienced man from outside although it may cost us considerable to train one of our men for the position, but we invariably do it, and it pays when you balance this one expense against the increased loyalty and efficiency we secure from hundreds of employés. It gives an employé a hope for something better; it spurs him on to put himself in line for the next vacancy; it holds him to the house.¹

The Crane Company of Chicago have even held a new line of work in abeyance until they could develop men to handle it. Mr. Richard R. Crane says:

Enlightened self-interest is in fact the essential bond of any organization. Mere appeal to sentiment counts for nothing. An employé is one with the house only when it affords him the best opportunity to coin his talents into dollars and cents and insures him of permanent employment. Even the apprentices we take into the shops are not held by formal contract. As a matter of fact, they usually stay, and virtually all our department heads and managers learned their trade with us or began as messengers. The certainty of advancement if they desire it is a stronger incentive to steadiness and efficiency than any formal contract could be.²

153. *Selecting the "right stripe."*—The employer of labor is more and more inclined to select men for their qualities rather than for their experience. If an applicant has ability and willingness to work he can be taught what to do, whereas laziness, dishonesty or wrong prejudices will inhibit the best experience.

¹ *System*, August, 1910, page 150.

² *Ibid.* Sept., 1909.

In determining an applicant's fitness, every employer of labor should have certain standards by which he forms his opinion before selecting them. These standards should involve an understanding of the requirements of the situation, a knowledge of the aptitudes, abilities, interests, ambitions, resources and limitations of the applicant; also careful consideration of the relationships of these two groups of facts.

In view of the importance which the average employer attaches to experience the following lists are very significant. One comes from an expert in the selling field, Mr. Hugh Chalmers, president of the Chalmers Motor Company; the other is from an authority in production, the late Mr. F. W. Taylor, famous engineer. Not more than one quality in each list refers to experience or business training. All the others are inherent in the men:

HUGH CHALMERS

1. Health.
2. Honesty.
3. Ability.
4. Initiative.
5. Knowledge of business.
6. Tact.
7. Industry.
8. Open-mindedness.
9. Sincerity.
10. Enthusiasm.

F. W. TAYLOR

1. Health.
2. Honesty.
3. Brains.

4. Grit.
5. Special knowledge, manual dexterity, or strength.
6. Tact.
7. Energy.
8. Judgment.
9. Education.

The employer may be greatly helped in choosing his men if he makes out a similar list of the prime characteristics which his own experience has shown him to be necessary in his business. With this list before him he can mentally check up the applicant, and feel sure that he has not let some essential slip by unnoticed. Mr. Chalmers' testimony may be helpful along this line:

When I was working as a salesman myself I was always trying to analyze successful men to find out the reason for their success. Later when I became sales manager and had to employ, train, and supervise men I had these (ten) requisites put on a blackboard in my office, and I used them for measuring men, for discovering their weak spots, and I have always found them very helpful.

154. *Make a man analyze himself.*—Besides the information which a manager of labor gathers from observation, there is much to be gained from a proper self-analysis carried on by the applicant himself. Although the man's estimation of himself may be wrong, nevertheless the manager will see the problem from a different angle and many a characteristic will disclose itself even where the applicant has attempted to cover it up. The following questions prepared by Mr. Gustav A. Blumenthal are suggestive of what may be done along this line:

- Where born?
- Is father living?.....His occupation?.....
- Is your health good?..... If not, what is your trouble?
.....
- What exercise do you take?.....
.....
- Are you fond of sports?..... If so, which?.....
.....
- What schooling have you had?.....
.....
- What are your favorite studies?.....
- In what studies are you weak?.....
- What kind of reading have you done?.....
- Are you following a definite line of reading or study now?
..... If so, what?.....
- Do you sing?..... Play on any instrument?.....
- Have you a hobby?..... If so, what?.....
- Does your mind concentrate, or skip from one thought to
another?
- Have you self-confidence?..... Patience?.....
- Are you inclined to be lazy?.... Do you act impulsively?....
- Do you make friends easily?..... Are you fond of company?
..... Are you sensitive?..... Are you inclined to think
yourself misunderstood?.....
- How do you spend your leisure time?.....
.....
- What are your pleasures?.....
- What habits or vices do you have to fight down in yourself?
.....
- Are your thoughts clean?..... Can you trust yourself?.....
- Do you consider yourself absolutely honest?.....
- Trustworthy?..... Conscientious?.....
- What is your religion?
- Are you a church member?.....
- Are you self-supporting?..... Can you save money?.....
- How many depend upon you for support?.....

Indicate the different occupations you have followed:

Occupation:	How long in it?	How did you like it?
.....
.....
.....
.....
What life do you think you would prefer?.....		
What training or special fitness have you had for this work?		
What is your present occupation?.....		
Do you like it?..... Why?.....		
Do you aspire to be an employer of men?.....		
.....		
What is your greatest ambition?.....		
.....		
Are you willing to pay the price in hard work to attain success?		

When the applicant has filled out the above blanks the employer may classify the information under the following headings: Mental characteristics; physical characteristics; moral and social characteristics; abilities and talents; vocation in which success may be reasonably expected; courses of study and hobby advisable.

155. *Use of written and oral tests.*—The oldest method of determining fitness is the written or oral examination, but little use has been made of it in the business world. However, the Chicago and Northwestern Railway has a system of progressive examinations running through three years.

Each fireman is given the first year's book of questions, the company's book of rules and a time card when he is employed. As soon as convenient after the expiration of his first year's service he is given a written examination thereon by the traveling engineer or

traveling fireman, who also examines him orally. If successful in passing this, he is given the second year's book of questions upon which he is examined a year hence in the same manner. At the end of his third year the fireman is examined by a joint board of examiners appointed for the whole system, which board sits in Chicago each spring and fall. Some of the traveling engineers and the airbrake instructors compose this board and their favorable report makes the man eligible to promotion to the position of engineer whenever needed as such on his own division.

The failure to pass any one of these progressive examinations results in a second trial six months later; two successive failures drop a man from the locomotive service at once. No man is permitted to waive his right to promotion.

156. *Testing for physical and moral fitness.*—Little need be said about the necessity for discovering a man's physical and moral qualities. The methods employed in obtaining data for physical fitness lie largely in the province of the physician and many business houses employ physicians for this purpose. But the testing for moral qualities is a comparatively new feature in business management. The usual procedure is to "size up a man," but so many mistakes are likely to happen in using surface appearances as the basis of judgment, that business men are demanding a more intimate analysis of their employés' character. They are beginning to recognize that the most desirable qualities, such as conscientiousness and loyalty, are less in evidence than initiative and polish, and while good clerks and mechanics may possess all of these qualities they may lack the knack of personal salesmanship.

Difficult as it is, the problem of placing the right

man in the right place is being successfully solved for continuously increasing numbers of men and women.

157. *Control by education.*—Business managements, like political governments, are coming to realize that the basis of control must rest finally on education. The tendency to adopt this point of view is indicated by the following examples:

The New York Edison Company offers educational facilities through an Educational Bureau and the Educational Committee of the Association of Employees. The committee prepares technical and accounting courses in which the attendance is voluntary. The Educational Bureau prepares the commercial courses and part of the routine work of the commercial department, and instruction is given on the company's time.

The commercial courses include hygiene, health and recreation; the basic principles of salesmanship; company organization; the elements of central station business-getting; and the fundamental principles of electricity. The school staff consists of a manager, instructor in charge and secretary. The term begins in October and closes in May. The work covers two years.

The technical courses consist of laboratory exercises preceded by a talk in which the instructor outlines the work briefly. Students are rated on their work. Prizes are offered to those having the highest standing. The course lasts 15 weeks—five evenings and one afternoon each week.

The accounting course was offered for the first time during the year 1912-13. It consists of a series of lectures by a professional teacher.

Besides these courses, the company has lectures given by their officials or by prominent speakers on general and public policy, etc., and on technical subjects.

The Metropolitan Life Insurance Company has a course in business English. It consists of thirty weekly lessons in grammar, composition and business letter writing. A fee of \$3.00 is charged. There are also classes in stenography and typewriting. The company maintains a circulating library of general literature, science, etc. In July, 1912, there were 6,729 books and pamphlets for use of the employés. The total membership of the library is 2,605. There is an average daily circulation of one hundred and seven books. A trained librarian and three assistants are in charge.

The National Metal Trades Association is lending its support to institutions which are teaching courses along industrial lines. For instance, in Chicago it cooperates with the Lewis Institute; in Cincinnati, with the Continuation School and Coöperative High School as well as the University; and in Cleveland with the Technical High School and Young Men's Christian Association.

In Hartford, Conn., the public school authorities have started a Continuation School to which the members of the Metal Trades Association will send their apprentices. In St. Louis, members are working with the Rankin Trade School where the apprentices are making gratifying progress. In Indianapolis a committee of the Association equipped certain buildings of the Winona Technical Institute with machinery, and furnished scholarships of the value of \$100.00 each for prospective students. The committees solicited contributions of equipment and scholarships from members of the Metal Trades Association.

The American Bankers' Association has a section called the American Institute of Banking. Its purposes are to educate bankers in their special lines, to

maintain a standard of education by official examinations and to issue certificates for the accomplishment of certain work. It has 12,000 members organized into 75 chapters in the principal cities of the country and in Cuba and Hawaii. Employes of country banks are enrolled as correspondence students. The course of study covers the theory and practice of banking and allied principles of law and economics. The course requires at least 100 hours of class and correspondence work under approved teachers.

Spencer Trask & Company of New York City, one of the largest bond investment houses in New York, gives a course of instruction covering financial organization. It requires its employes to study corporation finance, foreign exchange, the money market, theory of investments and analysis of current security fluctuations, speculation and the stock market. Their men are also required to pass examinations on political economy, money and credit, and the principles of salesmanship.

The National City Bank of New York provides classes in business correspondence, French, German, Spanish, penmanship, commercial arithmetic and book-keeping. These are given as a first-year course while a more advanced course is outlined for a second year of study.

158. *Special training for the company's work.*—Some firms try to give their employes specific training for their own work. Classes are held during work hours or evenings. They are supplemented by lectures on vital subjects such as hygiene, sanitation, diet, first aids to the injured, and other lines. The National Cash Register Company has an agent's school for salesmen, one for advertising, one for officers for the study of business management, and others for the foremen, janitors and

waiters. The same company has a kindergarten for the children of its employés, and cooking, sewing, and millinery classes, realizing that training which benefits the home makes better workers all around. The Heinz Company has cooking and sewing classes for its 700 girls, most of whom are immigrants. The Williams Company in Brooklyn instructs its salesmen and other employes and provides lectures for the foremen. Many companies provide libraries and reading rooms with technical literature and popular fiction and magazines.

Some firms distribute manuals describing the details of the work. One corporation published a 200-page book with cuts and reports, and gave one to each employe, who was supposed to read it all with special attention to the parts pertaining to his work. Quizzes are held frequently and those who are deficient in any subject are dismissed. The publication of the book cost \$2,000 but the company considers the money well invested. Each new man must read the manual so as to get a general understanding of the whole system. The effect has been good on both old and new workers, all making fewer mistakes. This makes it easier for the various departments to work together harmoniously. Each person knows why he is doing certain things, and as a consequence has much more interest in his work and greater enthusiasm. It gives him some comprehension of the part his work plays in the whole organization.

Firms are realizing more and more that definite instruction saves a great deal of time—not only for the individual but for the whole house. It pays to develop the ability of each one, especially as really capable men are so scarce. A man may so increase his capacity by having favorable opportunities as to be a wonderful asset to the company. The Simpson, Crawford Com-

pany of New York has an instruction room where each new clerk goes for a preliminary training. There are four sessions of from one to two hours each. The idea is to eliminate girls who are not efficient right at the start. The school saves the company much time as well as thousands of dollars, for trade may easily be driven away by inefficient clerks. Other stores follow the same system.

The National Commercial Gas Association is conducting several correspondence courses. One of these courses is mainly along the line of salesmanship, while another is devoted to the subject of business organization. Still another deals with the technical features of the gas industry. The following list of subjects suggests the ground covered:

The Real Salesman and the Near Salesman.

Practical Personal Elements in Selling Gas.

The Customer's Attitude Toward a Sale.

Building a Selling Talk.

Turning Technical Matter into Selling Points.

Factory Illumination—Selling Gas on a Large Scale.

Gas for Industrial Purposes.

The Salesman and the Corporation.

The Sales Department and the Organization.

The Basis of Departmental Organization.

Elements of Gas Manufacture.

Gas Distribution.

Accounting.

Business Correspondence.

Credits and Collections.

Public Utilities—Management—Financing.

Industrial Fuel and Power Engineering.

Illuminating Engineering.

Utilization of Gas and Electricity and Competitive Fuels and Illuminants.

The courses cover periods of ten months to three years. One pamphlet each month is sent to those enrolled. Questions are printed at the end of the lessons and the men send in written answers to the director of the courses. These answers are examined, rated and returned to the students. A certificate is issued upon satisfactory completion of the work.

Many of the above-mentioned corporations, as well as hundreds of other companies, are also cooperating in the work of the Alexander Hamilton Institute, which need not be here described.

CHAPTER IX

INDUSTRIAL BETTERMENT OR WELFARE INSTITUTIONS

159. *Beginnings of industrial betterment.*—Since the first factory act was passed in England in 1802 at the time when the interests of masters and workmen were more closely allied because of the small workshops and old methods of work, remarkable improvements have been made in the whole civilized world pertaining to the health and comfort of the workers in all branches of industry. By that act only the barest precautions were to be taken, such as the limewashing of the workrooms in a factory twice a year and their “due ventilation.” Hours of work were to be reduced to twelve a day. There was no limit to the age of workers, and children of 6 were allowed to work with their elders at the same machinery. The act applied principally to apprentices of cotton and woolen factories. Provisions were made for their learning to read and write, and they were obliged to go to church once a month.

Then came the first parliamentary inquiry in 1816, and medical men saw that it was absolutely impossible for the workers to retain their health under the conditions in the new factories. The inhaling of dust and fibre, the continual presence of filthy floors and constant expectoration, the lack of sufficient light and fresh air, as well as oppressively long hours, were common to all the factories. In the first half of the Nineteenth Century the figure of the “woman in unwomanly rags plying her needle and thread in poverty, hunger and

dirt," as depicted in Hood's "Song of the Shirt," was deplorably common. But with factory legislation, trade unions, and industrial betterment undertaken by employers, conditions have changed in Europe and America, until now we have such model factories as the Cadbury Chocolate works near Birmingham, England, where things are ideally healthful inside, and the employés are given an opportunity to live in a model village in model houses situated in little gardens amid attractive shrubbery and flowers.

160. "*Welfare institutions.*"—About twenty-five years ago a number of manufacturing concerns in Germany, which were subsidized by the government, introduced improvements in the methods of light, heating and sanitation in their workrooms, as well as rest rooms, emergency hospitals and lunch rooms for their employés. Houses at a low rental, recreation places, lectures, and industrial insurance were also included. These were considered entirely from the view point of individual betterment and were therefore called *Wohlfahrts-Einrichtungen*, or "welfare institutions."

By experience it has been found, in America as well as in Europe, that the promotion of the physical, mental, and moral welfare of the employés is actually a matter of profit to the employer. If healthy, intelligent, comfortable and happy workers do better and more work than those who are ill-nourished, unintelligent, miserable and ill at ease, there is no question but that it pays to have the former. If the workman is regarded and treated as an automaton, bad work, ill-will, disagreements, strikes and labor troubles result. If he is regarded and treated as a fellow worker by the employer, he is far more apt to conduct himself as such, and by interest in his employer's work there results im-

provement in workmanship, greater celerity, and a consequent increase of production.

Undoubtedly one of the chief causes of the trouble and turmoil in the industrial world to-day is the loss of touch between employer and employé. In the United States, the National Civic Federation and the American Institute for Social Service of New York City are making efforts to bring about harmony and sympathy between employer and employé by establishing industrial betterment branches about the country, and by publications, lecture tours and meetings.

In 1889 was begun the appointment by large concerns of social secretaries, who proved of untold advantage to the houses that employed them. They are sometimes called "welfare managers." Often they are women of ability, preferably university graduates. Their duties include the engagement of unskilled labor, the supervision of lunch arrangements, hours and terms of employment, the visiting of employés who are absent for illness or other causes, the overseeing of clubs, societies and social doings and things of a similar nature. When these welfare institutions are properly organized and managed they do not require a great deal of attention.

161. *Safety devices against accidents and fire.*—In a consideration of welfare institutions or industrial betterment, we must include the provision of safety devices against accidents and fire. There is no question but that if the employé's peace of mind is assured and if there is no perpetual nuisance or danger staring him in the face, he can devote his attention and energy more strictly to his work. In factories it is very necessary that proper screening and belting around the machines be provided. It is becoming more and more common to

introduce automatic devices for protecting the workers even if they be careless or incautious. Dangerous parts of machinery are shielded and so painted as to attract attention. Frequent boiler inspection is averting many accidents. In the long run precautions of this kind save money for the employer by avoiding claims for accidents.

The law requires that factories be built fireproof, but at present not all of them are fireproof. Even fire escapes are not of much use in case of a panic, any more than a fireproof building is if the inmates have all lost their heads in case of a sudden alarm. The only way to avert a panic is to have occasional fire drills. There are generally more casualties as a result of panic during a fire than from the fire itself, and often there is a panic from an alarm when no fire exists. In most places there are fire buckets or sprinkler systems. Still if no one knows how to use them in emergency they are not of much consequence. Automatic sprinklers would be of no use if there were not plenty of water at hand. For this reason they should frequently be looked after. A regular fire corps should be appointed from among the workers and drilled occasionally. Fire escapes too are often the cause of casualties. The lowest fire escape balcony generally has its ladder hung up so as to prevent the possibility of thieves and burglars entering the building. If the ladder is long and heavy, it is difficult to handle especially under the stress of excitement. Consequently there is a jam and much crowding on the stairs of the escape. By fire-drills, the employés may be instructed how to act—how to get to the escapes in an orderly way as quickly as possible, and then how to descend properly without crowding. Drills have been introduced in many factories with remarkably good re-

sults. After several of these, there is no danger of a panic. A building with hundreds of workers may thus be emptied in a very few minutes and all loss of life and even minor accidents averted. Drills pay in the long run, as in case of a real fire the firemen may devote their energies to the saving of property. Then too, the peace of mind of the workers is assured as they know that everything will run smoothly in case of alarm.

The most progressive firms now-a-days provide rest rooms and emergency hospitals in their buildings. Often a worker may be indisposed for several hours but by a short rest and a little care he may be able to go on with his work instead of going home and missing a whole day. Some of the rest rooms are provided with beds, couches, and bath rooms adjoining. Some firms even supply a nurse. Occasionally there is a doctor in daily attendance whose services are free. The nurses also visit invalid employés at their homes, and sometimes fruit and other things are provided by the company. Other firms keep a dentist on hand. The Diamond Match Company has a dentist and a doctor who watch the workers for symptoms of phosphorus poisoning.

162. *Light*.—The ideal modern factory or business house is situated in the suburbs of the great cities where fresh air, plenty of light and pleasant surroundings are to be procured at little cost. For example, the Cadbury Works are situated five miles from Birmingham amid beautiful gardens. The Waltham Watch works near Boston overlook the river and a well-treed village. The buildings of the National Cash Register Company at Dayton, Ohio, are surrounded by gardens. The Natural Food Company has magnificent buildings which stand in a park.

The smoke nuisance is gradually being done away

with. An understanding of a few chemical facts regarding the nature of smoke disposes of the obnoxious particles, and the entrusting of its control to a chemist not only disposes of the evil but saves fuel as well.

The obvious advantage of plenty of sunlight in workrooms leads to the use of much window space. Sometimes prismatic glass is used which throws the light directly into the center of the rooms. The office building of the Armour Company has 800 windows. The ceilings are fifteen and a half feet high. Each floor has 140,000 square feet of space. The windows are in sets of three at intervals of six feet. There are 1,500 electric glower lamps nine feet apart and besides four ninety-candle power lamps at intervals on each floor. The lamps are twelve feet above the desks. Electric light is superior to gas and other artificial lights because there is little danger from fire and no pollution of the air. Also, it but slightly affects the temperature and humidity of the atmosphere. Most of the large progressive firms now employ this method of lighting. Next in preference come the Welsbach burner and acetylene gas.

163. *Ventilation*.—Equal in importance to light is proper ventilation. One of the chief dangers of indoor life is the exposure to vitiated air. It is generally known now-a-days that the fresher the currents of outside air and the more directly they enter into the rooms the more beneficial are they to the individual. Bad air causes weariness, dullness and torpor. It stands to reason that an employé will not accomplish as much in this condition as when he is kept fresh and bright by good ventilation. Proper heating and cooling in the respective seasons are well worth the expense.

In the most important modern factories exhaust fans

are employed to draw off odors, steam, dust and dangerous gases. The National Cash Register Company's brass foundry is so arranged that the fumes from the furnaces can be collected and carried away at the roof. In one establishment in a Massachusetts foundry, a large flaring hood in the center of the room draws off the dust by upward suction draft, and the operatives wear helmets with fine wire inserts to protect the eyes while cloths under the helmets protect the nose and mouth. In the Parke-Davis Drug Works at Detroit the hall doors are hermetically sealed to prevent the dust of the hallways from entering the workrooms. The air is kept filtered and fresh and then drawn out so that the dust is kept from the workers as well as from the medicines and drugs. The office building of the Armour Company has tile ducts in the walls which carry fresh air through registers in the walls near the ceiling and the foul air is led away near the floor. Fresh filtered air is pumped in by a fan driven by a powerful motor in the basement. It is known that particles of iron and stone dust induce diseases of the respiratory passages, and that workers in lead, mercury, arsenic, phosphorus and dyes suffer from injurious effects.

164. *Sanitation.*—In connection with light and ventilation comes the consideration of cleanliness and sanitation. Realizing that next in importance to clean workrooms is the cleanliness of the individual, employers have provided facilities for this. Especially when foods and fine light colored materials and articles are handled it is imperative that the workers be absolutely clean. In many occupations a change to clothes proper for the work is insisted upon, and lockers as well as washing and bathing facilities are provided by all enterprising employers free of charge. The same thing

is necessary when workers are employed in dirty work.

The McCormick Harvester Works provide each machine shop with rows of marble basins for hot and cold water and soap and towels. The Cleveland Twist Drill Company provides shower baths. In the works of the Pope Bicycle Manufacturing Company at Hartford, Connecticut, warm water flows in a trough past the individual lockers. Each of these has also a cold water tap. At the Cadbury Works in England swimming baths are provided. The Natural Food Company has fourteen rooms with baths and the employés are allowed to use them in the firm's time; hot water, soap, and towels being provided free of charge. In Germany at the Krupp mines near Hanover 1100 miners are allowed to use the twenty-eight shower baths free of charge daily. The Spindlers near Berlin have free bath houses on the river with swimming instructors for their 1000 employés, while there is a small charge for hot, shower, steam or hot air baths.

165. *Rest hours and lunch rooms.*—Realizing the importance of proper and cheerful methods of eating as well as the absolute necessity of hygienic food, employers have established lunch rooms where healthful lunches may be bought at a low figure. More has been done in Europe along these lines than in the United States yet great progress has been made here too. Americans are still held up to ridicule for their patronage of "quick lunches," and dyspepsia continues to be the national disease. The picture of the shop girl or factory hand rushing out at noon to lunch upon ice cream soda, probably adulterated, or a cup of strong coffee and the proverbial piece of pie, is still laughed at by Europeans. Nevertheless this is becoming rarer under the newer facilities offered by employers.

In France there is a law which insists on dining quarters in connection with factories. In many of the large concerns a good lunch may be had for from 2 to 15 cents. The Krupps in Germany have dining-halls which are provided with ranges so that food brought from home may be properly heated. Milk, coffee, and rolls are to be bought at cost both morning and evening. Another big firm in Germany provides the same kind of dinner that is given to the German soldier—six ounces of beef, a quart of soup and vegetables—for 5 cents. Plain coffee is to be had at less than a cent a pint. Another dining-hall is provided for those workers whose families bring in their meals and who are allowed to eat with them.

In the United States the Natural Food Company gives free lunches to 350 girls. One hundred and fifty men can buy dinner for 10 cents at a lunch counter belonging to the company. Wanamaker's provide good meals at 10 cents for the employés at their stores. The Chicago Telephone Company gives a free lunch of tea or coffee with cold meat and fruit and other things with a frequent change of menu. The United States Playing Card Company of Cincinnati can seat 1230 in its dining-hall. The menu is posted outside the dining-hall door each day and the employés can make a selection in passing. They leave work in four batches. Each takes his plate from a rack and gets it filled on the way to his seat. At some of the mines in Colorado there is a bar where men may procure soft drinks and unadulterated alcoholic drinks of the best quality. This is to protect them from injurious and poisonous drinks, for it is a well-known fact that miners are much addicted to drinking. Many companies too provide plenty of pure spring or filtered water so that at least

while their employés are at work no risk from bad water is incurred.

166. *Recreation.*—The primary consideration in the matter of recreation is of course the adoption of an eight hour day, which many progressive firms have seen fit to do. Next is sufficient time for lunch and then perhaps one or two intervals of rest for a short period each day. We all realize that “all work and no play makes Jack a dull boy.” Just as much and even more work is accomplished in shorter hours. Faculties which are dulled by fatigue, weary muscles, and a mind fagged out are not conducive to good nor rapid work.

Many firms allow a few minutes of rest during the afternoon, realizing that their employés are under stress and tension which is greatly relieved by a short change, and that they really work faster as a result. Cheerful surroundings, good air, and light all have a recreative effect. Music is encouraging and restful and relieves the strain on the nerves. Some companies make it a practice to have music played on a piano sometimes accompanied by a song during work hours. No one doubts the enlivening effect of the band upon soldiers on the march. Why not have music in the march of industry? There are factories in which the operatives sing to the piano during work.

Many concerns provide outside amusements which may be indulged in during the noon recess. The girls of the Cadbury Works are allowed to go out upon the magnificent twelve-acre grounds, where there are tennis courts, cricket pitches and shady walks. The wish of the woman of the “Song of the Shirt,” who longed “but to breathe the breath of the cowslip and primrose sweet,” has indeed been realized in these days by her more fortunate sisters, who, in a figurative way, ply their needles

and thread industriously, but who can relieve the monotony by the sight of the sky above their heads and the grass beneath their feet. In wet weather the Cadbury girls go to the gymnasium where there are two instructresses who are employed by the firm. The men have several acres of ground with a pavilion and gymnasium, as well as cricket and football fields and a fishing pool. Mr. Carnegie at Pittsburg has a public library, a concert hall and organ, and also a swimming bath, a gymnasium and bowling alleys. A low fee is charged for their use.

Vacations with full or part pay are profitable to both worker and employer. In Europe, the Saturday half holiday is common and it is becoming more customary in the United States. Most big American concerns give summer vacations of one or two weeks and an occasional outing or picnic for a half day. The Siegel-Cooper Company of New York gives its 2000 women employés a chance to spend two weeks at their seaside home every summer.

167. *Effects of welfare institutions in general.*—A concern which treats its employés rightly gets not only the interest of the employé but of the buying public as well. A close bond of union between the management and the workers is essential to a concern's high name and reputation. Under harmonious relations, the rate and amount of production advance, allowing the employer to realize a profit while the workman gets a sufficiently high wage to live in comfort and peace. In one past year the industrial betterment system of the National Cash Register Company netted the company \$30,000. It stands to reason that a modern business, progressive and well managed, will attract a better class of workers than one which is not progressive and takes no interest

in the welfare of its employés. The lack of cooperation between employer and employé arouses the militant side of the trade unions, which results often in threats and violence. With coöperation and conciliation committees, any disputes may easily be settled, and the trade unions need no longer be defensive but may concentrate their energies on the development and elevation of the laboring classes, which will assuredly bring about industrial peace. Man-power—the personal element in business—is certainly the most influential element. The ideal business is the one where the individual is not only a part of the organization, but where the business becomes a part of the individual worker both during and after work hours.

168. *Suggestion system.*—In order to encourage new ideas on the part of the employés and to arouse their interest in the management generally, the suggestion system has been introduced in many of the most progressive business houses of to-day. It has been found to benefit both the employer and employé. Very often practical suggestions for improving methods are rewarded by prizes. Small locked boxes are distributed throughout the buildings and offices. They have a slit through which the written suggestion may be dropped. Each box is provided with a small pad of paper whose leaves can be detached. A carbon sheet is inserted so that there may be a duplicate sheet for the writer for future reference. Each suggestion must be signed by the writer in order to be considered. They are collected at regular intervals by a clerk who copies them without the name, and files the originals. The copy is sent to a committee representing both the employer and employés. These consider the suggestions and decide on

the awards. The system produces some wonderful ideas, sometimes of great value.

The suggestions may include the following considerations: improvements in machinery; improvements regarding the comfort, safety and general welfare of the work people; saving of time and expense; prevention of the waste of materials; improvements in factory and office systems, such as the keeping of records, duplication of circulars and advertising; improvements in methods and processes of manufacture as well as designs of products and so on. The salesmen are also encouraged to make suggestions along their lines, such as improvements in the products they represent and methods of advertising. Sometimes the suggestions are not practical, but they are generally suggestive at least, and with some modification will prove useful. The prizes range all the way from fifty cents to one hundred dollars. The National Cash Register Company distributed \$6,070 in one recent year in prizes. In this year they had over thirteen thousand suggestions, of which over a fourth were adopted. Sometimes the suggestions involve the taking out of patents. Some firms offer awards without a definite prize system. The rewards are generally distributed by progressive firms at a general gathering of all the employés at which a festival spirit prevails.

169. *Results of suggestion system.*—In order to make the system work properly there must be right relations between the working organization and management, between the worker and the employer. It seems to be a well-established idea that the suggestion system when properly managed is well worth while. It pays from a business point of view. Some business men object to the system because they think that the plan affords an

opportunity for petty complaints and interference in things which are not the affairs of their employés. It is only by testing it and examining the actual suggestions received that a firm can find out whether or not this is the case. Whether or not the individual suggestions alone pay may be inferred from the following notes of improvements made through suggestions of the workers at the National Cash Register Company.

One man suggested that a certain advertising pamphlet be sewn with cord instead of tying it with ribbon. This will save \$36 per month. The prize was \$30. Another suggested the use of riveting machines for studs in special counter frames. The counter frames in registers are made in ten pieces. These were formerly riveted by hand, but doing the work on a riveting machine saves \$171 per year. The award for this suggestion was \$20. Another person suggested that a number of pieces of registers made with very expensive metal could be fully as well made with a cheaper kind of metal which was just as strong. The saving amounts to over one thousand dollars a year. The prize award was \$30. A woman suggested an improvement in the engraving machine cutter by having a larger screw made for the spindle which holds the cutter on the engraving machine, making it more convenient for those who operate the machines. The award was \$10.

At the Cadbury Works near Birmingham, England, for every suggestion that is accepted and adopted, a prize is given from one shilling up to as much as £150 and £200 for exceptional suggestions. The following notes will give some idea of the character of the minor suggestions: A wire netting under the stools to put aprons and waste rags on; footstools in the shop; a scrap box with wheels; the removing of the lights overlooking

the table to second beam in front, as they are of no benefit when the work is stacked; hooks fixed to wall to keep the window cords straight; repairing of the tin over ventilator; the placing of a heat radiator in the Dental Surgery, as the fire grate is too small; the rolling of the top path in the girl's recreation ground, as it is rough and stony. These suggestions were carried out by the firm.

Major Charles Hine of the Harriman lines has given the following description of how he introduced the Unit System¹ of organization.

After starting the system, about the second day I got out of town and in the course of a month or so I came back to see how they were getting on, to check them up and, best of all, to steal some of the ideas that had been developed much further than had occurred to me. These ideas I could use on other divisions.

The suggestion system principle has a broad application. Many companies encourage intelligent criticism from their patrons. The Erie Railroad, for instance, leaves a blank page on all its local time tables headed: "This page is reserved for comments either favorable or unfavorable to the Erie Railroad."

The B. F. Goodrich Company recently sent cards to an ordinary automobile mailing list asking their opinion of tires and received 35,600 replies which it has worked up into a sales booklet. The *Good Housekeeping* magazine has long run a department of practical household hints called "Discoveries" paying \$1.00 for each discovery accepted. This is considered one of the most interesting departments by many of the paper's sub-

¹ Proceedings Western Railway Club, Jan. 18, 1910.

scribers and has proved so successful that it is widely copied.

Aside from the mere profit to the employers, the suggestion system, by stimulating the flow of new ideas and commanding the best efforts of every worker, is a step in industrial progress. It fosters cooperation, and coöperation has been found profitable both to employer and to employé.

CHAPTER X

SOURCES OF ADMINISTRATIVE INFORMATION

170. *Use of statistics.*—Only when statistics can be employed progressively are they effective. It is not so important that past conclusions be confirmed by our statistics as it is that deductions for the future be correctly drawn. Only when they take on this latter character may they be said to be vitalized.

Among the monthly reports of the Harriman lines is one of particular interest because it looks forward instead of backward. It asks not for an explanation of the unsatisfactory conditions shown by the figures, but for a statement of what action has been taken to correct them.

.....R. R.Division.
.....19....

General Superintendent:

Dear Sir.—I transmit herewith explanations of fluctuations in operating expenses for 19...., compared with the same period of previous years, having personally reviewed the month's exhibit.

The fluctuations are regarded by me as unsatisfactory, and I have taken action to improve results in future periods.

171. *Graphs and statistics.*—The graphic method of stating statistics, though inferior to the numerical in accuracy, has the advantage of enabling the eye to take in at once a series of facts. This advantage is not

of first importance when we are considering only one set of facts. Accuracy is then more essential than ease and rapidity of representation. But ease and rapidity are essential when we want to compare many sets of facts, because if the mind is delayed long in taking in the general effect of one set, it loses count of the others. The function of the graphic method is the comparison of different sets of statistics. President Brown of the New York Central recently told the New England Railway Club how a simple use of graphic charts saved the road \$2,000,000.

Thirty years ago we built four grain elevators in Buffalo. In 1909 it became necessary to rebuild them, and two million dollars were appropriated. However, I had an analysis made of the grain business, and plotted a chart of the curve of production and consumption. Those lines cross at 1913, meaning the probable end of exporting grain, and we decided to spend only \$80,000 and merely repair the existing elevators. At the meeting to-day even that appropriation was canceled at my recommendation.

172. *Indicating influence of one set of facts on another.*—Another function of graphic charts is the indication of the true influence of one set of facts upon another. For instance, it is known that cost varies with output. In starting a new business or shaping new plans it might be desirable to know just what this variation was likely to be in order to estimate how much business would be necessary to overcome the initial expenses, and what profit should be realized from a given volume of business. A chart will show far more clearly than statistical tables the variations of two factors in relation to each other.

173. *Comparisons of time periods.*—Still a third class of information which can be advantageously studied with the aid of curves is that which is compared from month to month, such as costs, sales, output, etc. Almost any kind of information can be plotted with time, as the horizontal coördinate, and the desired information as the vertical. Curves should always work out from the left-hand side and never from the bottom up. The advantage is that the curve can be kept up to date, that comparisons with previous and standard conditions are grasped more easily and present the results over a long period of time. For instance, the average market price of a product for every business day in the year can be shown in much less space than is possible in any other way. In the matter of output, sales, costs, etc., it is customary to carry in addition to the quantity for the period, the cumulative total for the year. The height of this curve always shows the total business to date and its slope shows whether the tendency is to increase, remain stationary or fall off. Conditions making for or against improvement may then be caught and reached sooner than they would be if tabulations of figures were used. Note, for instance, how quickly you catch in figure 12 the relation between orders and shipment. It also shows a cumulative total and illustrates the plotting of two or more curves to scale on the same chart.

174. *Reports.*—Reports from subordinate officers to the management are the most common means of collecting information. The trouble with them in most cases is that they are too long delayed to be of real service. Reports can be kept up to date. All that is needed is a time schedule. The payroll, to give a fam-

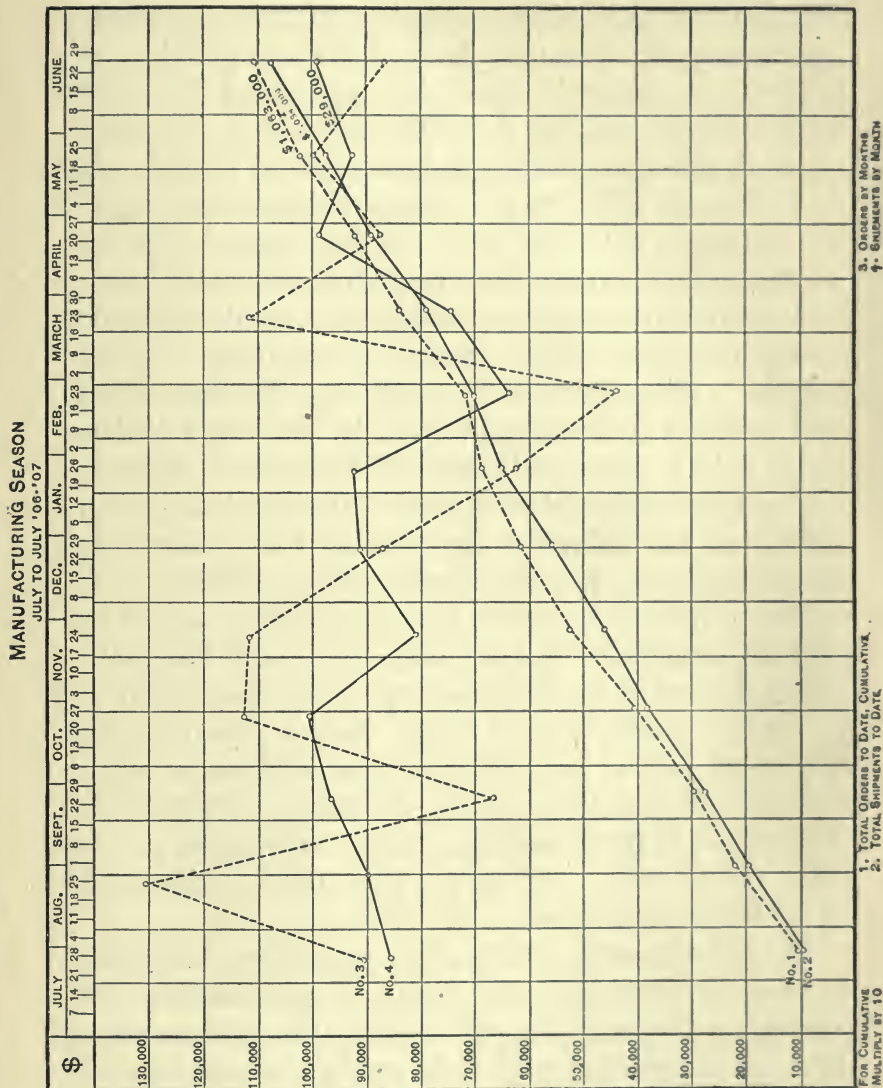


FIGURE 12.—GRAPHIC REPRESENTATION OF RELATIONS BETWEEN ORDERS AND SHIPMENTS IN A MANUFACTURING CONCERN.¹

¹ Reproduced by permission from Woods' "Reports on Industrial Organization, Systematization and Reaccounting."

iliar illustration, is always complete on Saturday morning, because the men must be paid at noon, but the cost department using the same data and doing the same work, merely making the debit instead of the credit entry, is allowed to fall a month or more behind. In fact, the only difficulty in keeping a department up to the minute is catching up at the beginning. The department that is regularly three months behind is handling a full day every day; otherwise it would continue to fall behind instead of remaining regularly at three months. After it has once caught up, the same effort will enable it to stay caught up. In fact, work that is up to date is more easily handled as errors or discrepancies are readily detected while the matter is still in mind, but are difficult to get at after the incident has been forgotten. Improved accounting methods, which utilize perpetual inventories and controlling accounts, make it possible to keep in daily touch with the financial condition of the business, instead of waiting for a monthly or yearly stock taking. Robert Owen, at the beginning of the last century, was accustomed when away to receive daily reports from the mills at New Lanark, so that present-day executives who are not in daily touch with conditions are more than one hundred years behind the times.

175. *Determining facts by inspection.*—Another method of determining the facts of a business is by inspection. One may be well assured that in these days of keen competition and close scrutiny of expense of all kinds the outlay for inspection must be considered a good investment, or it would not be tolerated by so many important companies.

The inspection methods of the Westinghouse Electric

and Manufacturing Company¹ are typical of large engineering concerns. The inspection department, which is under the supervision of the manager of works, consists of several hundred men divided into two sections; one for the inspection of apparatus building in its own works, the other for the inspection of all materials coming in from outside manufacturers, including the various raw and partly finished materials, also for apparatus of its own manufacture returned for any reason such as for repair or exchange, or returned from loans or exhibits, etc. Materials coming in from outside manufacturers are generally inspected upon arrival at the works, though certain kinds of special nature, such as bar pulleys, etc., are often given a preliminary inspection or test at the place of manufacture.

In addition, representatives of the company are sometimes delegated to inspect the works of manufacturers with whom there seems a likelihood of doing business to see if their facilities are such as to enable them to furnish materials of the degree of excellence required.

The material specifications prepared by the "Material Committee" are made use of by the inspection department in seeing that the materials supplied are actually as ordered.

A very complete chemical and testing laboratory is maintained by the company and full advantage is taken of it not only in the preliminary testing of raw materials but also in the examination of partly finished material or apparatus at various stages during the process of manufacture.

Careful records are kept of materials rejected or

¹ "The Work of Shop Inspection," C. B. Anel, *American Machinist*, May 25, 1911, p. 977.

found defective in any respect and steps are taken to see that such materials are promptly disposed of, to prevent any possibility of their becoming mixed with accepted materials.

176. *Inspection of work in process.*—In the inspections of the company's apparatus endeavor is constantly made in each department to inspect the work during the actual making as well as upon completion.

As there are 85,000 different items listed in the stock room it would be impossible to inspect every individual piece. With automatic and semi-automatic machinery, after it is properly set and working, it is only necessary to inspect a small percentage of the output to prevent the dies wearing out or getting out of alignment. On the other hand, apparatus which is made by hand with special limit gauges, templets, etc., requires detailed inspection of all its parts and this the company aims to give.

Next to inspecting the work while it is still in the workman's hands, the best method is to have the material after each operation delivered with an identification tag to an inspector and passed on before going to the next operator.

Some concerns hold each man responsible for defects in the piece on which he is working, thus causing him to examine all the work he receives carefully for errors of the preceding workers.

177. *Questions as guides.*—It is of great assistance to the inspectors, especially the new men who are being trained, to be supplied with some list of questions such as the following, which call their attention to the special points to be noted. The questions are so drawn that they may be answered by yes or no, thereby minimizing the writing required.

COMPLETE MACHINE INSPECTION TAG
 OF THE
 WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY

- Has frame been cleaned and painted inside?.....
- Are field coils tight and is bore of field correct?.....
- Are holes evenly spaced?.....
- Do interpole bolts extend beyond shot face?.....
- Are connections between field coils properly cleaned and insulated
- Has flame-proof braid been removed from brush holder ends and replaced by tape?.....
- Are housings entirely free from dust and core sand?
- Do bearings and housings fit, and is alignment correct?
- Are oil grooves chipped in cells?.....
- Is drain hole provided for waste oil?.....
- Are brush holders properly spaced and brush tension correct?.....
- Are brushes parallel with commutator segments?.....
- Are oil covers properly fitted?.....
- Is pinion tight on shaft and key properly fitted?.....
- Does gear case clear gear?.....
- Did commutator develop high-bar on test?.....
- Serial
- Order
- Inspected by.....

178. *Qualifications of inspectors.*—Inspectors should be chosen from experienced workmen and, if possible, from the department where they will serve as inspectors. They should be men who are imbued with the responsibility of their position and with good judgment not only in passing on materials but in dealing with men.

Judgment must be used in inspection because some

variations from drawings in no way affect the utility of the machine, whereas other variations do. All defects and variations are given careful consideration to determine whether the piece should be scrapped outright, whether the imperfection may still be rectified or, if the feature be an unimportant one, whether the machine or apparatus may be passed as it stands. Of course, a full knowledge of the situation is required before an intelligent decision can be arrived at. If the inspector is undecided he refers the matter at once to the department head, stopping all work thereon pending a decision.

179. *Information from the outside.*—The efficiency of inspection depends in very large degree upon the aid received from the engineering, correspondence, testing and other departments. Every letter of complaint is accepted at its face value and thoroughly investigated: first, with a view to ascertain the cause of the trouble; second, with a view to prevent a recurrence of it. It will be found decidedly efficacious when complaints are received involving defective workmanship to send now and then the foreman or inspector of the department at fault to see for himself the cause of the trouble. In this way their viewpoint will be broadened and they will appreciate more fully than they would otherwise the necessity of good work.

No matter how adequate the precautions may be, there will be certain points, particularly with new apparatus, or new applications of standard apparatus, that can only be gleaned from actual experience. Hence, the works must depend to a large extent upon the suggestions of their erecting gangs and customers.

180. *Various kinds of inspection.*—Inspection as a means of gaining information is not confined to mechan-

ical lines. Traveling auditors perform similar duties in a different field. Spasmodic inspection, however, unless backed by proper reports, is apt to give erroneous impressions. Conditions are apt to be unusual and the men nervous. In fact, companies often waste considerable money in this way. When it is rumored that an inspection is to take place, men are knocked off from their regular work and set to cleaning up because so many executives confuse appearance and efficiency. This may be overcome in part by having the inspection take place unannounced; but better by the percentage system, which provides that a certain percentage of the work will be examined or an established number of inspections made, the particular lot or time of inspection, of course, being unknown. If the work inspected proves satisfactory the entire amount is passed. If any defects are found the entire lot is carefully examined for further errors.

181. *Inspection and research.*—Closely allied to inspection, so closely allied in fact that one set of apparatus often serves the two functions, is research. The two functions are, however, distinct; inspection is for the purpose of insuring that the work and material shall come up to certain prescribed standards. Research is for the purpose of determining these standards and for discovering possible improvements in the product or the manufacturing processes. Research is much like advertising; its value is cumulative. The first results are apt to be disappointing and absolutely worthless if the work is discontinued. When the general plan of recording all results is followed, however, apparently useless results often prove of great assistance in solving future problems. The General Electric Company spends annually two and a half million dollars in mak-

ing and developing inventions. In addition to its experts it employs a corps of twelve patent attorneys and twenty-eight assistants. The Westinghouse Electric Company maintains a department almost as large and expensive. The Pennsylvania Railroad Testing Laboratories at its Altoona shops were established in 1875, and employ over 200 men. The American Telephone and Telegraph Company, the Hoe Printing Press Company, and scores of smaller companies carry a force of men upon salaries whose duties are to invent and develop the possibilities of inventions.

182. *A large research laboratory.*—Probably one of the largest and best equipped commercial laboratories is that of the J. I. Case Threshing Machine Company, which makes every kind of machine used in threshing grain. It has its own facilities, but to offset the heavy expense of maintaining the laboratory, it does commercial work for other firms.

The laboratory occupies four rooms in the company's office building. One is the laboratory office in which the reports are made up and the results of the various analyses and tests recorded for use, reference and distribution. The office contains a library of several hundred volumes on subjects relating to chemistry, physics, electricity, heat, power, manufacturing, etc. The fine instruments, microscopes, barometers, hygrometers, anemometers, machines for electrólisis, grease-testing machines, glue testers, etc., are also kept here. Among them are a number of very delicate scales, one sensitive to the 1,200th part of a milligram.

Samples of all kinds of minerals, paints, oils, drugs, paper, cloth, leather, rubber, cordage, fuels, clays, brick, etc., are kept here for reference, inspection and comparison. The collection of samples forms a valuable

education not only for the chemists but for the shop foremen.

The system of record keeping is careful and accurate, and data for years back are a very valuable feature. One set of books is used for research work, one for recording chemical analyses, one for physical tests, and one exclusively for foundry work.

183. *Commercial results.*—The head of the laboratory is not only an expert chemist, but has had many years of practical experience in the iron and steel, rubber, leather, oil, paint and other industries. Being thoroughly practical, he is able to judge of the value of any particular chemical analysis or physical test. This, of course, is essential in a laboratory of this kind, for while any chemist may be able to make an analysis, yet in applying chemistry to practical work he may be entirely at a loss, and through lack of personal experience in the manufacturing or commercial side of the problem he may often do more harm than good. Each of the assistant chemists handles a special line of work so that the laboratory runs in a systematic manner.

A very important feature of its work is the making of specifications for the raw materials which the company uses. This involves a great amount of testing and research work.

Another feature is tracing the causes of failures and breakages and, if necessary, finding a remedy for the trouble. This is also an important feature of the work of the Pennsylvania Railroad and the Westinghouse testing laboratories and their procedure is almost identical with that of the J. I. Case Company. Thus, if a threshing machine shaft, bearing or belt, proves defective or breaks for an unknown cause it is shipped to the laboratory and carefully tested and examined. If the

fault is due to poor workmanship or defective materials the chemist reports the fact and it is replaced free of charge. If the examination fails to show the cause the foreman or chemist is dispatched to the locality where the trouble occurred to make a thorough investigation. If an inordinate strain has been applied or unusual conditions introduced, the investigator is in a position to suggest or make the necessary changes. Although this method is expensive, the company feels fully repaid in that it insures the confidence of its customers and tends to improve future output.

184. *Time study*.—One phase of research work which has awakened a great deal of interest, and to which reference has been made in preceding sections, is “time study,” that is, the scientific determination of the amount of time it should take a man to do a given piece of work. Frederick W. Taylor, who has been so closely associated with time study methods, describes it as follows:¹

It has been the writer’s experience that the difficulties of scientific time study are under-estimated at first and greatly over-estimated after actually trying the work for two or three months. The average manager who decides to undertake the study of “unit times” in his work fails at first to realize that he is starting a new art or trade. He understands, for instance, the difficulties which he would meet in establishing a drafting room, and would look for but small results at first if we were to give a bright man the task of making drawings who had never worked in a drafting room, and who was not even familiar with drafting implements and methods, but he entirely under-estimates the difficulties of this new trade.

The art of studying “unit times” is quite as important and as difficult as that of the draftsman. It should be undertaken

¹ Trans. Am. Society Mechanical Engineers, vol. 24, p. 1423.

seriously and looked upon as a profession. It has its own peculiar implements and methods, without the use and understanding of which progress will necessarily be slow, and in the absence of which there will be more failures than successes scored at first.

In the course of this work Mr. Thompson has developed what are in many respects the best implements in use, and with his permission some of them will be described. The blank form or note sheet used by Mr. Thompson, shown in Fig. 13, contains essentially:

1. Space for the description of the work and notes in regard to it.

2. A place for recording the total time of complete operations—that is, the gross time including all necessary delays for doing a whole job or large portion of it.

3. Lines for setting down the “detail operations” or “units” into which any piece of work may be divided, followed by columns for entering the averages obtained from the observations.

4. Squares for recording the readings of the stop-watch when observing the times of these elements. (If the squares are filled, additional records can be entered on the back.)

The size of the sheets, which should be of best quality ledger paper, is $8\frac{3}{4}$ inches wide by 7 inches long, and by folding in the center they can be conveniently carried in the pocket or placed in a case containing one or more stop-watches.

In the illustration the operation consists of a series of elements. In such a case, the letters designating each elementary unit are entered under the columns “Op,” the stop-watch is thrown to zero, and started as the man commences to work. As each new division of the operation (that is, as each elementary unit or “unit time”) is begun, the time is recorded. During any special delay the watch may be stopped, and started again from the same point, although as a rule Mr. Thompson advocates allowing the watch to run continuously, and enters

Form C & 64a. S. E. T.

Operation		Date, March 19, 189		No. Men		No. Shovels		No. Tools		No. Material	
		Op. Time	Stop	Op. Time	Stop	Op. Time	Stop	Op. Time	Stop	Op. Time	Stop
Operation <i>Whullarrow Excavation</i>											
Department <i>Construction</i>											
Men <i>Walter Flaberty</i>											
Materials <i>Sand requiring no pick</i>											
<i>Hard clay in tank</i>											
Instruments <i>No. 3 shovel - Contractor's wooden whullarrow</i>											
Conditions <i>Work for a contractor</i>											
<i>By previous observation</i>											
<i>an average borrow load of sand is 2.32 cu. ft. measured in cut</i>											
<i>- - - - - clay - 2.15 - - - - -</i>											
Complete Operations											
Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time
7 A.M.	Commenced loading sand	12.2	2.84	a	Filling borrow with sand	4	12.40	0.89	13.2		
9.02	43 loads wheel to a distance of 50 ft.	122		b	Shoveling	4	0.82				
9.50	Picking hard clay	45		c	90 wheeling full - 50 ft	4	0.225				0.450
11.39	39 loads clay wheel to a distance of 109	109		d	Dumping & turning	4	0.172				
11.46	Picking clay again	7	55	e	Returning empty - 50 ft	4	0.260				0.520
12.01	4 loads clay wheel to a distance of 60 ft	15	12.4	f	Shoveling borrow starting to load	4	0.162				
		301		g		4	2.24				
NOTE: Comparison of detail with Complete Operations shows that about 75% of the total time was taken on rest and other necessary delays.											
<i>about the same quantity load as at the start.</i>											
<i>corner James Monroe</i>											
				a'	Filling borrow with clay	4	19.45	0.144	13.5		

FIGURE 13.—FORM FOR TIME STUDIES.

the time of such stop, designating it for convenience by the letter "Y."

185. *Time study reduced to formula.*—The elementary operations are usually fewer in number than the complex processes of which they form a part. This greatly simplifies the problem. When the standard elemental times have been determined and tabulated, the standard time for any new work can be determined without making a special study by combining the proper known elemental times. In fact, formulas can be deduced exactly like other engineering formulas in which the varying quantities such as the distance traveled, or the weight moved, may be substituted and which give when solved the standard time the job should take.

Any variation between this standard time and the actual time taken in doing the job represents avoidable loss. To eliminate the waste it is often necessary to change the workman's methods of doing the work or to re-design the machinery so as to facilitate operation.

Where the operations run into the thousands the best results are obtained by grouping them into classes depending upon the similarity of design, shape and mechanical operation, and then to make an accurate study of each group. While it is probably true that the deductions made from these tests will not be as thorough as would have resulted from individual tests, a systematic examination of such classes gives quicker and better results than could be gained by a haphazard examination of the whole field.

186. *Written aids, books, periodicals, etc.*—Books on topics connected with management are of value as a basis for obtaining an education in fundamental prin-

ciples or as a convenient reference. A great philosopher has said that one half of a man's education consists of knowing where to get information. For keeping abreast of the progress in one's own field, however, it is also necessary to supplement the information in books by periodical literature.

Among the most valuable sources of printed information to-day are the trade papers and the proceedings of the various technical societies. These sources supplement each other. The latter are somewhat more general in that the proceedings enumerate the theories, the discoveries, or results of experiments conducted by the members.

In the same class with the proceedings of the technical societies must be placed the various publications offered by the general and state governments. While the various departments of agriculture are doing the best work, much valuable information concerning business is contained in the publications issued by the bureaus of commerce and labor. A small charge is made for some of them, but the majority are issued free. Illinois has established an Engineering Experiment Station in connection with its schools of engineering and has investigated such important topics as fuels, building material, railroad equipment, publishing its findings for the benefit of Illinois manufacturers.

The Superintendent of Documents, Washington, D. C., publishes two monthly catalogs, listing all publications of the Federal Government.

In addition to making use of the library facilities of the community, many companies find it advisable to maintain specialized libraries of their own, either separately or in connection with their testing laboratories. These libraries collect special material, such as literature

of their competitors, forms, formulas, etc., which cannot be secured through the regular channels.

187. *Study of competitive methods.*—Another source of information is one's competitors. When the Pennsylvania Railroad considered the question of pensions a special committee on Superannuation and the Pension Fund was appointed by the advisory committee of the relief department. The committee examined into and reported upon the various systems of pensioning in operation on more than seventy of the leading railroads of Europe, America, Asia, Africa and Australia. When the Weston Electrical Instrument Company resolved to build its new plant at Newark, N. J., it sent three practicing engineers on a year's tour of American plants, two of the engineers to study mechanical features and one to discover what arrangements other companies were making for their employés' comfort.

Mr. C. B. Anel, Assistant Manager of Works, Westinghouse Electric & Manufacturing Company, in a recent speech before the National Machine Tool Builders' Association, said:

Recognizing that methods of manufacture which had in the past been satisfactory for their needs were proving inadequate to handle the increasing volume of business, for the reasons already stated, the Westinghouse Electric and Manufacturing Company spent considerable time in investigating the methods of other large companies in similar lines of business, with the result that it was believed advisable to modify the original scheme in favor of the so-called "factory system."

In a recent article in the *American Machinist* appeared this significant paragraph:

The firm stands ready to furnish information concerning its experience in this line, which may be useful for others who are thinking of establishing laboratories for themselves.

The liberality with which American companies are willing to share their experiences has often excited the surprise of European visitors, since abroad the methods of doing business are zealously guarded from all outsiders. In fact, so general is the get-together idea in American industry that a firm's willingness to give information is a fair indication of the value of the information it has to give. Small concerns are often opposed to giving away "trade secrets," whereas the large corporations are glad to show visitors through their works and to furnish any information within reason. On the other hand, many of them make a practice of sending their foremen and department heads to visit other factories.

One method which has proved effective in writing to a competitor for information is to state, "this is the way we are now handling the matter; if you have a better method we should like to hear of it." Another method when making an extended investigation is to state the fact and offer other companies copies of the results, provided they will cooperate by describing their methods. A recent inquiry of this kind addressed to fifty firms concerning their method of applying the "suggestion" system brought thirty-five replies.

188. *Consulting experts.*—Specialists exist in almost every line of business. There are consulting engineers, certified public accountants, testing chemists and patent lawyers. In the steel business there are agencies which will inspect the work in the mills, while in general there are advertising and sales experts and information bureaus without number. This work is now being systematized through many agencies, so that the business man may secure information more readily than has previously been possible.

CHAPTER XI

SAVINGS IN TIME AND MATERIAL

189. *Time-saving by "routing."*—London and Paris first learned of the death of Pope Leo XIII from New York, although New York is 3,000 miles farther from Rome. This was because the Associated Press had routed the news.

As a courtesy to the Church, so that Cardinal Rampolla might have time to notify the Papal delegates, the Italian Minister of Telegraphs refused to allow any news of the Pope's death to pass until two hours had elapsed. When the Pope died an attaché immediately telephoned the Associated Press representative two miles away, who in turn cabled to the New York manager personally, as had been previously agreed, "The number of the missing bond is 404 Montefiore." To avoid any suspicion the number which gave the time of the Pope's death was to be written backwards, as 352 for 253, or 53 minutes past 2. It happened that this made no difference. When the telegram arrived in New York its contents were shouted to the sending room and each operator flashed the news over his circuit. Although the message was delayed at Havre and again at the French Cable Company's office in New York, the New York papers knew of the Pope's death nine minutes after it had happened and the San Francisco papers, eleven minutes. The foreign newspaper agents in New York sent the news to their respective cities long before these cities had heard directly from Rome.

In the Associated Press methods, we find an admirable illustration of efficiency gained through careful planning and routing.

The routing of news seems easy perhaps because of the nature of the substance routed. The routing of materials over a line of railway is the next best field from which to draw an illustration. Since the elements here involved pertain to industrial routing as well as to transportation it is well to study them carefully.

190. *How a train is routed.*—The physical routing of a railroad train is done by the locating engineers who lay out the line. They make a preliminary survey, plot out the results, estimate the cost of the various proposals and after much preliminary study arrive at a solution. There are four factors in railroad location:

1. The needs of the country traversed, connecting with the large cities, etc.

2. A straight line is the shortest distance between two points.

3. Gravity is a force. Working contrary to it by lifting the train is energy wasted. Grades are a very important part in railway location, because they determine the load an engine can haul.

4. Cost—1 per cent grades and straight track are desirable, but if a hill intervenes it may be more economical to go around.

It is the interplay of these four factors that determines which scheme shall eventually be selected. A chart often helps to show the relations of these factors to each other.

When the track has been laid and regular trains are to be run, a train schedule is drawn up, a dispatching system is installed and a train dispatcher is put in charge.

The dispatcher's business is to route the moving trains. The entire force must have absolute confidence in the skill of the train dispatcher. His work requires undivided attention. He must know accurately the road, its cuts, curves, gradients, sidings, and the capacity of the equipment with which he works. The train dispatcher is the creature of emergencies; he is the doctor when something goes wrong with the road. He is in constant touch with all moving trains, and when anything goes wrong it is he who tells each conductor and engineer what to do. He must be a man of action, familiar with every detail and able to take advantage of every situation. His special duty is to designate the meeting and passing places of trains and to keep in motion trains which would otherwise be stalled. At the same time he must prevent trains from overtaking each other. The *Railway Age Gazette's* statistics of railroad accidents show that one-fifth are rear-end collisions.

This fact is of enormous importance to the dispatcher, for every mistake may involve human lives.

If human life depended upon the decisions of the route clerk in the factory as closely as it does on those of the train dispatcher, more attention would be called to this important function in ordinary business life.

191. *Essentials in routing.*—Railroad dispatching has three characteristics:

1. A route carefully laid out.
2. A prearranged time schedule or time table of all trains based on the experience of the road.
3. A train dispatcher, whose duty it is to keep the trains moving according to schedule and, if this is not possible, at least to move them to the best possible advantage.

The proper routing of work through shop or office is characterized by the same three features:

1. A prearranged route.
2. A predetermined time schedule.
3. A dispatcher.

A near approach to the railroad schedule in the commercial world is the delivery-routing system of a big retail store.

192. *Securing a good plant layout.*—The physical routing of the work in a business is determined mainly by the plant layout in exactly the same way that the railway train route is determined by the track, and the same care should be given to laying out the plant that is given to a railroad survey. This subject has already been touched upon in Chapter VIII of "Organization," but requires some further consideration here.

Mechanical helps are of great assistance in arriving at the best solution just as the chart is of great assistance to the railroad man in developing his time table. It is well to cut templets to scale of the machines including their necessary clearances and working spaces and then shift these until the best departmental arrangement is found. A symmetrical arrangement is always the most economical use of space. Then cut templets of each department and fit them into each other in the same way as to arrive at the complete layout. It is much easier to shift paper than to carry the idea in one's head or to work up a sketch with rubber and pencil. Another method is to prepare several distinct layouts on tracing paper and then by superimposing them make a final sketch including the best features of each. This method is followed by most architects. When the ultimate solution is determined by the site, as in a city lot or in rented quarters, this method works well; but where

perfect freedom is possible it is not likely to give so good a layout as the first method, since it works from the wrong end. The ultimate solution of the layout of any business will be determined by the interplay of the same four factors, work to be done, straight line movement, gravity, and cost. But while this is true in general, differences in application of the principles arise as soon as they are applied to industrial conditions.

193. *Straight line between terminals.*—All manufacturing touches the outside world at two points—the receiving and shipping departments. These are the terminals of the road, and the simplest and best layout, other things being equal, is a straight line between these two points. Where the plant has only one connection as one street or one railroad siding, the general character of the routes must be in a circle, so that the start and finish will be at the same point, or a U or series of U's both ends of which touch the outside world. When, however, other exits are possible, receiving and shipping need not unduly influence the routing, but be located to facilitate manufacture. As soon, however, as these elementary conditions of location of the “industrial terminals” are passed there appear more important complications which affect the routing.

194. *Various types of manufacture.*—All manufacturing is analytic, continuous, assembling, or more often a combination of all three processes. Thus the United States Steel plant at Gary is analytic in that it breaks the coal up into coke, gas and tar, each of which must be henceforth handled separately. Next it is assembling, in that it unites the coke, ore and limestone which must be received separately and united in the blast furnaces. It is then analytic, in that it separates the iron from the slag which is subsequently manufactured into

cement, and finally continuous in that the iron continues without further additions until it emerges as bars.

195. *Analytic manufacture.*—This type is one in which the main material is gradually dissected to form many products, one of which is, however, usually of predominating importance. The best illustration is the meat industry where the carcass is broken up into beef, hides, bones, etc., each of which is treated separately after it once leaves the main stream. The important point in such industries is to provide means of taking away the parts that are removed, so they will not collect and block the main stream of work.

196. *Continuous manufacture.*—This is the type in which the mass remains the same throughout the process, being merely acted upon and changed in form. This is by far the simplest and might be compared to a canal where the entire bulk of the water enters at one end and leaves at the other. In weaving the thread enters at one end and, with the sole application of labor, emerges as cloth at the other. In milling the wheat enters at one end and the flour emerges at the other.

197. *Assembling manufacture.*—This is the process in which many different materials are received, worked upon and gradually brought together to make the finished whole. Building is the best illustration because it is exclusively an assembling operation. It assembles the bricks, cement, plumbing and other manufactured products into a house. The important thing in assembling is to see that the necessary parts come together at the right time and place, for all subsequent movement must wait until not only a majority, but all the parts arrive.

198. *Passageways must be provided.*—Whatever the type of manufacture, sufficient room must be allowed

to provide convenient access to all parts of a machine, and for the removal of any machine whenever necessary. Sufficient area must exist for the storing of as large a supply of working material and finished material as may be necessary without interfering with the passageways. Storage facilities must be provided at each point where the flow of work is likely to be interrupted and where two streams unite. In order to minimize this area, the most economical method of stocking should be determined and the space allotted on this basis.

199. *Transportation.*—Adequate transportation facilities must be provided.

The open areas must be wide enough to permit the passage of two trucks in the aisles and for the sidetracking of trucks around machines. A truck system involving the retention of the material in the trucks, with as little unloading as possible, is an important feature and one deserving attention in an establishment. It involves the building of a considerable number of trucks, and departmental supervision, but is likely to result in economy. In some instances trucks are desirable, built so as to pick up and deliver a sheet-steel keg for holding work in progress. An ample supply of metal "tote boxes" for holding small parts will facilitate stock moving and lessen losses of small parts.¹

Derricks, traveling cranes, or industrial railroads are a great convenience in handling heavy materials and are often a necessity. Belt, link, gravity or pipe lines are serviceable where the material is uniform or will flow. Where the plant consists of several buildings it is customary to connect them by a system of tunnels radiating from the power house. These tunnels have cement floors, brick and cement walls waterproofed with

¹ Hugo Diemer, "Factory Administration," p. 15.

asphalt. They are large enough to accommodate the trucks used and for a man to stand upright. They usually carry the electric and water pipes but no drainage.

All service departments, such as stock rooms, drafting rooms, tool rooms, wash and locker rooms, should be centrally located so as to be equally accessible from all the departments which they serve.

Certain departments are by their nature mutually exclusive.

Obviously it would be inconsistent to have a saw mill in the same room or enclosure with departments for shellacking and final finishing of wood surfaces, as good work of this character cannot be performed where the surrounding air is carrying even a small amount of dirt or grit.¹

Some work, on the other hand, is better done in conjunction with other work of the same kind. Stiff hats are dried four distinct times during their manufacture and it would be uneconomical to equip four separate drying rooms in order to prevent retracing one's steps.

200. *Growth must be allowed for.*—Even railroads are now accustomed to look into the future and build their bridge piers and terminals to accommodate the expected increase of traffic. The first requirement for systematic expansion is land. One of the main reasons big businesses are moving from the cities to the suburbs is to provide for future growth. It is essential, however, that a growing concern

shall not burden itself at the beginning to provide for future prospects. One of the surest plans a concern can follow to prevent it from ever requiring expansion room is to incur too

¹ Day, "Industrial Plants," p. 51.

heavy an expense in securing a location that will permit future growth.¹

201. *Expansion not to interfere with flow of work.*—The buildings should be designed to permit expansion without disturbing the flow of the work. The simplest style is the one-story building taking its light from the roof. This can expand indefinitely in all four directions. In all multiple story building side lighting must be provided for and so growth is only possible by extending the ends or building separate additional buildings, much as a filing cabinet is built up by adding units. This is possible only in schools or textile mills where the work is uniform and can be shifted from building to building without loss. Where the movement is a straight line from the receiving room to the shipping room the lateral growth will add capacity without changing the method. An example of this is the plan of the United States Steel Corporation's plant at Gary.

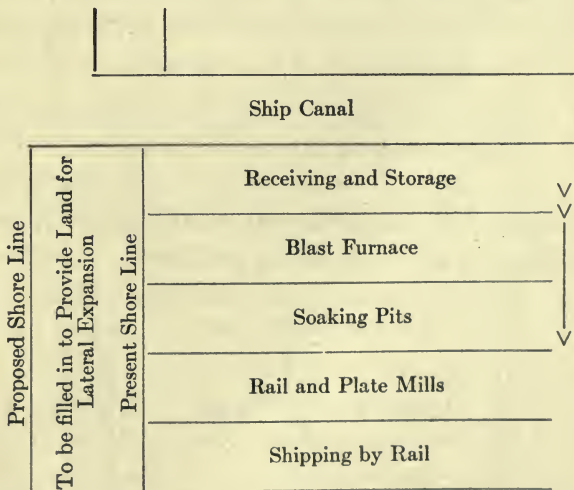


FIGURE 14.—GENERAL LAY-OUT OF U. S. STEEL PLANT AT GARY

¹ Duncan, "Principles of Industrial Management," p. 34.

The same idea in multiple story buildings is shown in the Wagner Electric Manufacturing Company of St. Louis and the Allis-Chalmers Company.

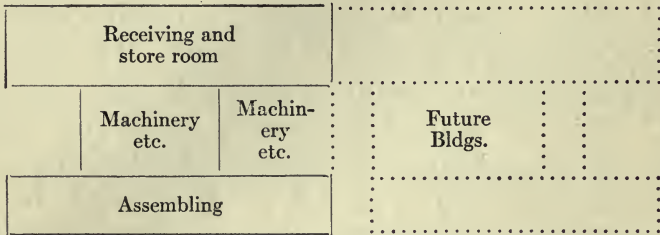


FIGURE 15.—LAY-OUT OF A PLANT WITH MULTIPLE-STORY BUILDINGS.

The idea underlying all such building is to have the work which may need the most room in the future touch the growing end.

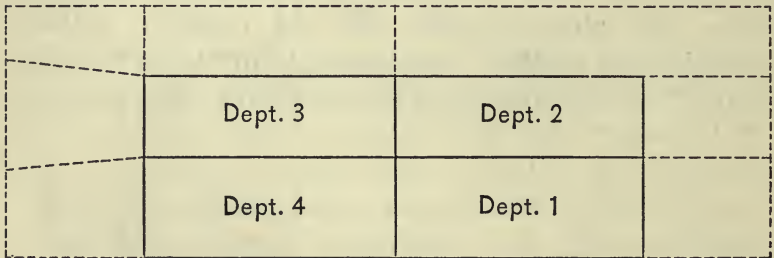


FIGURE 16.—CORRECT LAY-OUT OF DEPARTMENTS.

By arranging the departments as in Figure 17 growth in departments 2 or 3 would be excluded.

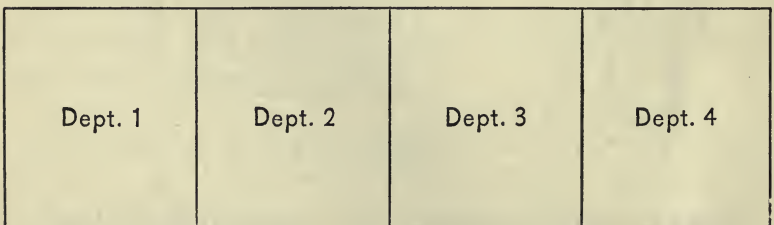


FIGURE 17.—INCORRECT LAY-OUT OF DEPARTMENTS.

202. *Taking advantage of gravity.*—The force of gravity being universal, it influences manufacturing no less than railroading. Every time a load is brought down stairs and taken back again, energy is wasted. There are two ways to avoid this waste. The materials may be taken directly to the top floor and allowed to work back systematically to the first through the manufacturing processes, or they may be started on the ground floor and systematically worked up to the top. The finished product is then brought down. The first way is usually the better as the energy stored in moving the materials to the top may be economically used to transport them through the manufacturing processes back to the shipping room on the ground floor.

Gravity should be recognized in small individual operations as well as in a great mass. In the best organized shops machine tenders are no longer allowed to drop their product on the floor. They take it from a movable table at machine height and pass it through the machine to another movable table so that when the work is finished the materials can be rolled to the next operator, thereby saving the lifting and the carrying. The trucks should have large wheels and large beamings.

Lifting goods to a car or truck is unnecessary as the shipping room should be level with the floor of the car or truck.

203. *Time element in routing.*—Routing, however, involves not only materials and locations but time as well. Much routing in a high stage of development has gone unrecognized as such because business time schedules are not often recognized as such, being expressed as quantity of output. The time schedule of the Carnegie Steel Company, for instance, was a constantly increasing number of tons of steel per week and every superin-

tendent who fell below this mark was expected to explain. When analyzed, 5,000 tons per week simply means that 5,000 tons must be completed in 7×24 or 168 hours, in other words, that each ton must not take more than $168 \div 5000$, or .0336, hours to produce.

204. *Two types of routing.*—From the time schedule standpoint there are only two classes of manufacture:

1. For stock; that is, the factory turns out the same thing continuously, throwing the responsibility of finding a market for the product on the sales department. This class includes textiles, typewriters, shoes, furniture, clothing, pianos and most ordinary goods which are consumed in quantity. Quantity time schedules are adequate for manufacture for stock.

2. For specific contract; that is, a single object made to a customer's order. This class includes repair work on orders from the general shops, but its most important application is the assemblage of large engineering works such as locomotives, large machinery, steamboats and buildings. Making connections is the important thing in manufacturing, as it is in railroading, for one late part will stall the entire work. A premature arrival is as bad as a delay. If the steel for a modern skyscraper arrives before the foundations are complete, chaos ensues, for it is constantly in the way, retarding the work which must be done before the steel can be set. It may take a month or more to straighten out the confusion. It is therefore necessary to figure out the time necessary to manufacture each separate part, and to schedule the starting date of each succeeding operation accordingly. These time schedules resemble ordinary railroad time tables.

For example, in the Thompson-Starrett schedule for construction of a New York office building, shown in

Figure 18, it will be noticed that the foundations start 11-1 (November 1), the day the excavation is finished and not sooner, and that the steel erection starts 11-24 (November 24), the day the foundations are finished. The granite, however, depends not only upon the steel, but upon the foundation walls, and so the granite starts as soon as they are brought to grade, 12-8 (December 8). The limestone follows the granite 12-10 (December 10) and the brick succeeds the limestone 12-15 (December 15). The floor arches, however, depend again on the steel and follow right behind the rivets before the steel work is complete, and so throughout the building. The difference of a day or two between operations is to allow the time necessary to get the material on the job and so be able to start at once.

205. *When special dispatching is necessary.*—As in railroading, the time schedule is the important thing and the more spectacular method of special dispatching is resorted to only when unforeseen circumstances occur. Therefore, personal dispatching is of comparatively little importance in manufacturing for stock, especially where automatic machinery is used which sets the pace for the operator. It is, on the other hand, an important adjunct to manufacturing for specific orders, because, on account of its irregular nature, the general and repair work cannot be mapped out in advance and because the elaborate schedule of a building or other work may be entirely invalidated by the carelessness of one individual. Like the train dispatcher the industrial dispatcher must *know* his shop, its exact condition, its capacity, special characteristics of men and machines and the amount of work and materials he has on hand.

206. *How to plan the routing.*—But the dispatcher,

Form K 61

TIME SCHEDULE

THOMPSON-STARRETT COMPANY

CLASS Office-Loft

BUILDING 123 WILLIAM STREET

No. 245

DATE Dec 31, 1909

OFFICE SCHEDULE			WORK	JOB SCHEDULE			
ARCHITECTS DRAWINGS TO LET CONTRACT	CONTRACT MUST BE LET ON OR BEFORE	DETAILS FOR SUB-CON		START		FINISH	
				MO.	DAY	MO.	DAY
			1 STEEL DRAWINGS				
			2 ARCHITECT'S DRAWINGS				
			3 WRECKING				
			4 EXCAVATION		10-10		11-1
			5 DRAINS AND WATER		10-10		10-20
			6 CAISSONS—PILES				
			7 FOUNDATIONS—CONCRETE		11-1		11-25
			8 WALLS TO GRADE		11-25		12-8
			9 WATERPROOF		11-25		2-10
			10 GRILLAGE—COLUMN BASES		11-10		11-20
	9-10	9-20	11 STEEL ERECTION—STACK		11-24		1-1
	10-10	10-15	12 ORNAMENTAL IRON—STAIRS—PLAIN		12-5		1-10
			13 " " FINISH		2-3		3-10
	10-10	10-20	14 ELEVATORS—GUIDES—TEMP. CAR		12-20		1-25
			15 " " CAR—SIGNAL—TEST		2-20		3-20
	10-10	10-15	16 BOILERS		12-5		1-5
	11-1	11-15	17 PUMP—TANKS		1-8		1-20
	10-20	10-28	18 ARCHES		12-8		1-10
	10-20	10-25	19 PLUMBING—GAS—ROUGH—TEST		12-3		1-20
			20 " " FINISH—FIXTURES		2-10		3-15
	10-20	10-25	21 HEAT—VENTILATION—ROUGH		12-3		1-20
			22 " " REGULATION—FINISH		2-10		3-15
	10-20	10-25	23 ELECTRIC—ROUGH—TEMP.—LIGHT		12-3		1-20
	11-10	11-25	24 " " FIXTURES—MOTORS		2-10		3-15
	10-25	11-2	25 COMMON BRICK WALLS		12-16		1-20
	9-25	10-5	26 GRANITE		12-6		12-10
	10-1	10-15	27 BLUESTONES		12-6		12-10
	10-1	10-15	28 LIMESTONE—MARBLE		12-10		12-16
	9-25	10-1	29 TERRA COTTA		12-20		1-20
	10-5	10-25	30 FACE BRICK—ENAMELED		12-15		1-12
	10-5	10-25	31 SPECIAL BRICK—MOULD—FIRE—HOLLOW		12-15		1-12
	10-25	11-5	32 WOOD FRAMES—SASH		12-16		1-20
	10-25	11-2	33 METAL FRAMES—SASH		12-16		1-20
	10-25	11-2	34 PULLEYS—WEIGHTS—CHAINS		12-16		1-20
	11-15	11-25	35 GLASS		1-7		1-20
	11-10	11-20	36 ROOF COVER		1-8		1-25
	11-10	11-20	37 SHEET METAL		1-8		1-25
	11-10	11-20	38 BUCKS		12-26		1-25
	11-15	11-25	39 STRIPS AND FILL		12-28		2-1
	11-22	11-28	40 PARTITIONS AND FURRING		1-4		2-5
	12-5	12-15	41 GROUNDS AND LATH		1-10		2-12
	11-20	12-1	42 PLASTER—PLAIN		1-19		3-1
			43 " " ORNAMENTAL		2-1		3-1
	11-5	11-15	44 MARBLE WALLS—TILE		2-1		3-1
			45 " " FLOORS—TILE, MOSAIC, TERRAZZO		2-10		3-10
	11-5	11-15	46 HARDWARE—FINISH		1-28		2-18
	11-15	11-25	47 TRIM—WOOD		2-10		3-20
			48 " " KALEMEIN		2-10		3-20
	11-25	12-5	49 PAINT—DECORATION		2-20		3-20
	12-1	12-15	50 FINISH FLOOR—WOOD—CEMENT		2-20		3-20
			51 MAIL CHUTE		12-20		2-28
			52' REVOLVING DOOR				
	1-10	1-15	53 PAVING—SIDEWALK—CURB		2-16		3-8
			54 VAULT WORK				
			55 FILTER				
			56 SPRINKLER—PNEUMATIC—SWEEPING				
			57 ICE PLANT				
			58 LAUNDRY—KITCHEN				
			59 ENGINES—GENERATORS				
			60				
			61				
			62				
			63				
			64 FINISH BUILDING—SCHEDULE TIME				3-20
			65 " " CONTRACT TIME				4-1

FIGURE 18

FIGURE 18.

or the order-of-work clerk, is not supposed to work out his schedules alone. The planning department provides him with all the necessary information as to what work is to be routed and how it is to be routed. The order-of-work clerk dispatches his jobs in accordance with these instructions. He must keep in mind a multitude of details regarding the machines, the men and all the jobs which have been routed for him, for it is his duty to keep the work moving. Accordingly, he is supplied with a dispatch or "route" board, the instrumental means by which the planning room controls the operating departments.

207. *What the route-board is.*—This board which contains many groups of hooks, each group being composed of three sets, placed one above the other, shows the progress of all work and the movement of all material from point to point. When a job is assigned to a machine, the operation card is hung on the lowest one of a series of three hooks, each machine or working area in the shop being represented on the bulletin board by one of these sets of three hooks. Thus when a job is assigned to a machine it shows that all drawings, instruction cards, etc., are ready; that the materials are on hand and everything ready for the machine to begin its work. It is then that the "operation order" which covers a given operation goes on hook No. 3, the lowest hook and the one which represents all "jobs ahead in the shop" for that machine.

Next, when the materials have been moved to the machine, the operation order is put on hook No. 2, "jobs ahead *at* machine."

Finally, when the job is actually begun the operation order is moved to the top hook, No. 1, "job *on* machine."

The order-of-work clerk, or for that matter any person interested, can follow the movement of a job through the shop by watching the operation orders on these three hooks. If the job should be moved to another machine then the operation order would be assigned to another group of three hooks corresponding to the second machine.

208. *Planning board signals all movements.*—Thus the “planning board” signals the movements and indicates the sequence in which the jobs are done. This it does for the planning room; but the man in the shop must also be informed of these movements, for his activities depend on them. He must know whether he is to work at the same or a different machine after one job is completed. He cannot run to the planning room every time. Hence a miniature “bulletin board” is put in the shop; and when an order in the planning room goes to hook No. 2, “jobs ahead at machine,” a duplicate order goes upon the shop bulletin board notifying the worker, as he consults it, what jobs have been planned ahead for him.

209. *Questions answered by route-board.*—By means of this route-board, as it is sometimes called, a whole series of questions vital to the management can be answered immediately: (1) what job shall be done first; (2) if a machine breaks down what other machine can do the work; (3) if a man is absent what other man can do the job; (4) what is the cost of any operation on any machine for any hour, or what is the total cost of all operations going on on all machines in any hour.

210. *Status of work in progress.*—In all quantity manufacture—as for stock where the contract work is divisible into working units, as, for example, a railroad embankment into cubic yards—a regular proportion

must be completed in each unit of time to finish the entire contract punctually. If the shop is unable to produce its quota at the start, it will surely be unable

FOUNDRY PRODUCTION SHEET
AMERICAN LOCOMOTIVE COMPANY, SCHENECTADY WORKS

ORDER NO. 83
8 ENGINES O. L. & C.

PART	BELL STAND.	EXHAUST PIPE	TRUCK FRAME CENTER PIN	ENGINE TRUCK FLYING EOLASTER	GRATE BAR	GRATE SIDE	GRATE SIZE	ASH PAN END	ASH PAN ELDER	GRATE FRAME SUPPORT	GRATE BAR
PATTERN NO.	17,212	17,939	10,227	18,907	19,438	18,933	18,464	21,243	21,341	18,909	18,961
PATTERN DUE	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2
PATTERN REC'D PER DAY	1-22	1-22	2-6	2-4	2-0	2-10	2-10	2-10	2-10	2-14	2-14
NO. WANTED	1	1	1	1	8	2	2	1	1	1	1
TOTAL NO. WANTED	8	8	8	8	64	10	10	8	8	8	8
NUMBER MOULDED	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>
1903 FEB.	<i>2</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>2</i>
	<i>3</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>3</i>
	<i>4</i>	<i>4</i>	<i>4</i>	<i>4</i>	<i>4</i>	<i>4</i>	<i>4</i>	<i>4</i>	<i>4</i>	<i>4</i>	<i>4</i>
	<i>5</i>	<i>5</i>	<i>5</i>	<i>5</i>	<i>5</i>	<i>5</i>	<i>5</i>	<i>5</i>	<i>5</i>	<i>5</i>	<i>5</i>
	<i>6</i>	<i>6</i>	<i>6</i>	<i>6</i>	<i>6</i>	<i>6</i>	<i>6</i>	<i>6</i>	<i>6</i>	<i>6</i>	<i>6</i>
	<i>7</i>	<i>7</i>	<i>7</i>	<i>7</i>	<i>7</i>	<i>7</i>	<i>7</i>	<i>7</i>	<i>7</i>	<i>7</i>	<i>7</i>
	<i>8</i>	<i>8</i>	<i>8</i>	<i>8</i>	<i>8</i>	<i>8</i>	<i>8</i>	<i>8</i>	<i>8</i>	<i>8</i>	<i>8</i>
	<i>9</i>	<i>9</i>	<i>9</i>	<i>9</i>	<i>9</i>	<i>9</i>	<i>9</i>	<i>9</i>	<i>9</i>	<i>9</i>	<i>9</i>
	<i>10</i>	<i>10</i>	<i>10</i>	<i>10</i>	<i>10</i>	<i>10</i>	<i>10</i>	<i>10</i>	<i>10</i>	<i>10</i>	<i>10</i>
	<i>11</i>	<i>11</i>	<i>11</i>	<i>11</i>	<i>11</i>	<i>11</i>	<i>11</i>	<i>11</i>	<i>11</i>	<i>11</i>	<i>11</i>
	<i>12</i>	<i>12</i>	<i>12</i>	<i>12</i>	<i>12</i>	<i>12</i>	<i>12</i>	<i>12</i>	<i>12</i>	<i>12</i>	<i>12</i>
	<i>13</i>	<i>13</i>	<i>13</i>	<i>13</i>	<i>13</i>	<i>13</i>	<i>13</i>	<i>13</i>	<i>13</i>	<i>13</i>	<i>13</i>
	<i>14</i>	<i>14</i>	<i>14</i>	<i>14</i>	<i>14</i>	<i>14</i>	<i>14</i>	<i>14</i>	<i>14</i>	<i>14</i>	<i>14</i>
	<i>15</i>	<i>15</i>	<i>15</i>	<i>15</i>	<i>15</i>	<i>15</i>	<i>15</i>	<i>15</i>	<i>15</i>	<i>15</i>	<i>15</i>
	<i>16</i>	<i>16</i>	<i>16</i>	<i>16</i>	<i>16</i>	<i>16</i>	<i>16</i>	<i>16</i>	<i>16</i>	<i>16</i>	<i>16</i>
	<i>17</i>	<i>17</i>	<i>17</i>	<i>17</i>	<i>17</i>	<i>17</i>	<i>17</i>	<i>17</i>	<i>17</i>	<i>17</i>	<i>17</i>
	<i>18</i>	<i>18</i>	<i>18</i>	<i>18</i>	<i>18</i>	<i>18</i>	<i>18</i>	<i>18</i>	<i>18</i>	<i>18</i>	<i>18</i>
	<i>19</i>	<i>19</i>	<i>19</i>	<i>19</i>	<i>19</i>	<i>19</i>	<i>19</i>	<i>19</i>	<i>19</i>	<i>19</i>	<i>19</i>
	<i>20</i>	<i>20</i>	<i>20</i>	<i>20</i>	<i>20</i>	<i>20</i>	<i>20</i>	<i>20</i>	<i>20</i>	<i>20</i>	<i>20</i>
	<i>21</i>	<i>21</i>	<i>21</i>	<i>21</i>	<i>21</i>	<i>21</i>	<i>21</i>	<i>21</i>	<i>21</i>	<i>21</i>	<i>21</i>
	<i>22</i>	<i>22</i>	<i>22</i>	<i>22</i>	<i>22</i>	<i>22</i>	<i>22</i>	<i>22</i>	<i>22</i>	<i>22</i>	<i>22</i>
	<i>23</i>	<i>23</i>	<i>23</i>	<i>23</i>	<i>23</i>	<i>23</i>	<i>23</i>	<i>23</i>	<i>23</i>	<i>23</i>	<i>23</i>
	<i>24</i>	<i>24</i>	<i>24</i>	<i>24</i>	<i>24</i>	<i>24</i>	<i>24</i>	<i>24</i>	<i>24</i>	<i>24</i>	<i>24</i>
	<i>25</i>	<i>25</i>	<i>25</i>	<i>25</i>	<i>25</i>	<i>25</i>	<i>25</i>	<i>25</i>	<i>25</i>	<i>25</i>	<i>25</i>
	<i>26</i>	<i>26</i>	<i>26</i>	<i>26</i>	<i>26</i>	<i>26</i>	<i>26</i>	<i>26</i>	<i>26</i>	<i>26</i>	<i>26</i>

Begin moulding "*not*" later than date opposite upper heavy line
 Finish "*not*" later than date opposite lower heavy line

FIGURE 19.—THIS IS A PORTION OF AN ORDER SHOWING HOW THE RECORDS WERE ACTUALLY KEPT. THE FIGURES IN ITALICS REPRESENT CONDEMNATIONS. THEY ARE USUALLY ENTERED IN RED INK.¹

to make up the shortage in addition to the regular allotment at the end. It is, however, in the assembling industries that the progress of work must be most care-

¹Reprinted by permission from H. L. Gautt's "A Graphical Daily Balance in Manufacture," in Transactions American Society of Mechanical Engineers, Vol. XXIV, p. 1324.

fully watched. On the first indication that any one part is falling behind, thus making likely the delay of the entire work, it should be brought up to date either by

ORDER NO. 77
13 ENGINE N. Y. C.

A. L. Co. PRODUCTION SHEET
SCHENECTADY WORKS, MACHINE SHOP No. 1

PART WUR. ORD; SKETCH; PAY. OR. CARD DR. NO. OPERATION	FRAMES						RAILS					
	Rec'd	Planted	Slotted	Drilled	Assem'd	Rec'd	Planted	Slotted	Re-Pl. To	Re-Pl. Bot	Drilled	
TO BE BEGUN												
TO BE FINISHED												
NUMBER WANTED	15	15	15	15	15	80	80	80	15	15	80	
NUMBER FINISHED	DAILY TOTAL	DAILY TOTAL	DAILY TOTAL	DAILY TOTAL	DAILY TOTAL	DAILY TOTAL	DAILY TOTAL	DAILY TOTAL	DAILY TOTAL	DAILY TOTAL	DAILY TOTAL	
1903	20	2	2	2	2	6	6					
JAN.	21	2	4									
	22	1	2	4		6	12	6				
	23	1	5									
	24	2	7	1	2	2	12	4				
	25	4	11	2	4	6	18	4	1	1	1	
	26											
	27											
	28	1	12	3	7	4	22	4	20	2	10	
	29	2	14	1	8	4	26	4	24	4	14	
	30	1	15	1	11	2	30	4	18	2	6	
	31			3	14	1	30	2	20	4	18	
FEB.	1					2		2	20	6	22	
	2					2		2	20	6	22	
	3	1	15	1	12	2	30	2	30	2	15	
	4					2		2	30	2	15	
	5					2		2	30	2	15	
	6					2		2	30	2	15	
	7					2		2	30	2	15	
	8					2		2	30	2	15	
	9					2		2	30	2	15	
	10					2		2	30	2	15	
	11					2		2	30	2	15	
	12					2		2	30	2	15	
	13					2		2	30	2	15	
	14					2		2	30	2	15	
	15					2		2	30	2	15	
	16					2		2	30	2	15	
	17					2		2	30	2	15	
	18					2		2	30	2	15	
	19					2		2	30	2	15	
	20					2		2	30	2	15	
	21					2		2	30	2	15	
	22					2		2	30	2	15	
	23					2		2	30	2	15	
	24					2		2	30	2	15	
	25					2		2	30	2	15	
	26					2		2	30	2	15	
	27					2		2	30	2	15	
	28					2		2	30	2	15	
	29					2		2	30	2	15	
	30					2		2	30	2	15	
	31					2		2	30	2	15	

Record as Actually Kept

FIGURE 20.—RECORDS AS USUALLY KEPT.¹

employing men overtime or by increasing the force. Comparative figures are always more intelligible and therefore it is better, if possible, to combine the progress

¹Reprinted by permission from H. L. Gautt's "A Graphical Daily Balance in Manufacture," in Transactions, American Society of Mechanical Engineers, Vol. XXIV, p. 1324.

report and the time schedule which shows, at all times, the state of the job in relation to the schedule.

The American Locomotive Company's progress report is shown in Figure 19. The upper and lower heavy, black lines indicate the time schedule and correspond with the start and finish dates on the Thompson-Starrett schedule. They are printed in red on the original form and are known as the danger lines. A black line is ruled under each department when all the work is finished to indicate this fact to the chaser. Figure 20 shows the same form as used in the machine shops. The starting and stopping lines have been left off to avoid confusion. It will be noticed that the different operations follow one after the other in regular sequence. Any department holding up the work shows that fact immediately, for its figures do not follow those of the preceding department.

The information to keep such a report up to date may be obtained from the shop by the coupon form of order (Figure 21). This order which follows and is usually wired fast to the piece resembles a railroad ticket with a coupon for each department. When the work in any one department is completed the coupon is etached and returned to the dispatcher who enters the fact on his report. In this way it is possible to know by noon of any day the exact state of all work in progress up to quitting time of the day before and so it is possible to push work which is falling behind. But in shops where the planning department is fully developed the state of work is indicated on a "progress-of-work sheet" by the record clerk when the job is given out and when the ticket is returned by the worker. In outside work and work done by contractors it is customary to get the information by personal inspection.

<p style="text-align: center;">ORDER FOR CASTING</p> <p>Date No.</p>	<p style="text-align: center;">FOUNDRY REPORT CARD</p> <p>No. Date</p> <p style="text-align: center;">Detach and return to Office when castings for above are</p> <p style="text-align: center; font-size: 1.5em;">Put in Hand</p> <p style="text-align: right;">Signed</p>	<p style="text-align: center;">PATTERN ROOM REPORTCARD</p> <p>No. Signed</p> <p style="text-align: center;">Detach and return to Storekeeper when patterns are</p> <p style="text-align: center; font-size: 1.5em;">Sent to Foundry</p> <p style="text-align: right;">Signed</p>			
<p style="text-align: center;">RETURN THIS CARD TO FOREMAN WHEN ABOVE ARE CAST</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 5px;">FINISHED</td> <td style="border-right: 1px solid black; padding: 5px;">NOTED</td> <td style="padding: 5px;">UP</td> </tr> </table>	FINISHED	NOTED	UP	<p style="text-align: center;">Storekeeper to initial and return to Office</p>	
FINISHED	NOTED	UP			

Returned to Office when pattern is sent to foundry

Returned to Office when Castings are started

Returned to Office when castings are finished

FIGURE 21.—COUPON FORM OF ORDER TICKET.

Thus one of the most important duties of Thompson-Starrett's "chasing department" is to visit regularly the sub-contractors and to report exactly how their work stands with reference to the time schedule.

211. *How to route office work.*—The New York Clearing House is a good example of the value of routing in office work. Each bank has a numbered desk, and is represented by two men, a delivery clerk and a settling clerk. The settling clerk remains at the bank's desk and receives, records, and receipts the checks returned by the other banks. The delivery clerk takes his place in front of his bank's desk and on the manager's signal moves to the desk on his left, delivers the package of checks, drafts, etc., drawn on that bank and deposited in his own bank and after receiving a receipt for the package moves forward to the next desk, and so around the room, until he circles the whole room and returns to his own desk. All the delivery clerks move simultaneously and by this method the banks are able to exchange over \$300,000,000 in about ten minutes.

212. *Time schedule of the Clearing House.*—The dispatcher is the manager of the Clearing House. He directs the operations from his raised balcony at the end of the room.

9:59 Clerks must be in their places. Failure to be punished by fine.

10:00 Delivery starts.

10:45 Time up for making proof. Fines will be imposed for all mistakes remaining unlocated.

11:15 Fines will be doubled for all mistakes remaining unlocated.

12:00 Fines will be quadrupled for all mistakes remaining unlocated.

1:30 Time up for settling debit balances. A fine will be imposed on all debtor banks who have failed to settle their account with the Clearing House.

1:30 Credit balances will be paid by the Clearing House except that no credit balances will be paid until all the debit banks have settled.

The efficiency of this schedule is proved by the fact that although the annual clearings have exceeded \$100,000,000,000, the total of all the fines imposed have never exceeded \$1,422 a year (1889) and have fallen as low as \$280 a year (1904).

213. *How organization saves time.*—The purpose of organizing is to enable each employé to work under the best possible conditions of team-play. The management should remove all obstacles to the workman's full performance and supply all the aids necessary. Delays not only waste the workman's time but shut down his machine. It is well to remember that an employé is not working for himself, and any assistance which an employer can give him enables him to do this work more intelligently.

The workman needs certain elements in doing his work. These include power, machinery, tools, materials and the coöperation of the management and his fellow employés. The need for supplying machines and power is so obvious as to hardly need mention. What needs emphasis is that the workman must be *continuously* supplied with power and equipment, in other words, that he be protected from delays due to break-downs, etc.

214. *Substitute power equipment.*—The commonest method of guarding against power shortage is by the

provision of substitute power equipment. Many of the New England mills operated by water power find it necessary to have steam plants to help out during periods of drought. Similarly many concerns in New York City using electric power find it advisable to continue their old engine equipment, even though the Edison Company offers to buy it up.

Substitution is a valuable preventive in all lines, even though the substitute is more expensive than the thing it replaces. The difference in cost will be more than offset by the saving of *time*, the most expensive factor in business.

215. *Equipment "tickler."*—An ounce of prevention is worth a pound of cure. The most efficient maintenance is the replacing of a part before it actually breaks. A tickler system is a valuable aid. The best type of tickler is one which has a portfolio for each day in the year which should be large enough to insert all reminders. Notices should be placed in the tickler in advance to come out at proper intervals throughout the year for the examination and repairs at stated intervals of parts of machines, boilers, engines, belts, etc., likely to wear out or give trouble

216. *Other methods to avoid shut-downs.*—Another method is the annual shut-down of the plant as practiced by the National Cash Register Company, the Remington Typewriter Company and other large concerns. All the operators are given their vacations at the same time, the plant shuts down and the entire equipment is overhauled. In the steel industry it has been found advisable to relieve the furnaces each Sunday, whether they need it or not, so as to avoid their burning out during the week. In the same way ships find it advisable to overhaul all machinery while in port and

to replace worn parts even though they might last another trip, rather than take chances on breaks in mid-ocean.

No matter how carefully things are watched, occasional break-downs are bound to occur and the best way to minimize the loss is to be prepared for them. The stock room should always carry a stock of repair parts, and the plant should have adequate wrecking equipment, such as traveling cranes and hoists for taking out and replacing the broken machinery.

217. *Stock-keeping system a necessity.*—In order to guarantee sufficient and proper tools and materials, a modern stock-keeping system is essential. The duty of a stock or tool department, as described by Harrington Emerson, is to supply the *right material*, at the *right place*, at the *right time*, in the *required quality*, in the *minimum necessary quantity* and at the *lowest cost*. In addition to preserving the materials from deterioration, loss and waste, the stock-keeper must anticipate the shop's needs so as to prevent the loss of time in waiting for supplies. The supplies are furnished to the workmen at his machine or desk and he is not allowed to leave it. His duty is to run that machine, for when he is away getting supplies or gossiping with other workmen at the storeroom window, his work is being neglected.

The tool room is in charge of a tool expert who has the care of all tools and the sharpening and keeping them in shape. No workman is allowed to stop and sharpen his own tools. He must call for a new one. In fact, he is supplied with a call bell so that he does not have to go after the tool but has the tool brought to him. The workman quickly realizes the justice of this plan, and when he knows his bonus depends on it,

it is interesting to see how he makes the helpers step around. Some companies even go so far as to supply to each man a standard kit of hand tools which he must use constantly and a locker in which to keep them, instead of letting him furnish his own. For these he gives his receipt, promising to return them or their value on leaving the company's employ. The advantages of this method are:

1. It reduces the number of tools required.
2. It enables the shop to obtain exact standards.
3. It assists the shop in dictating the exact method of doing the work.

218. *Three rules of store-keeping.*—The interest on the capital released by a maximum and minimum stores system will often pay the entire expense of the department. Store-keeping is commonly broken up into tools, rough stores or raw materials, and finished stores ready for shipment. Often it is much further divided into finished parts waiting assemblage, or other grouping, as occasion demands. However, the principles of handling these classes are the same and very simple.

There are only three operations in store-keeping: the receipt of goods, the issuance of goods to workmen and the preservation of the remainder on hand. There are only three rules to stock-keeping:

1. A receipt is to be given for all goods received.
2. A receipt is to be taken for all goods delivered.
3. Some one must be responsible for stores on hand, just as a cashier is held responsible for all cash.

219. *Receiving supplies.*—Goods are received from only three sources. The first and by far the largest portion is purchased from outsiders. Before being

placed in stock these goods must be carefully checked as to quantity and quality, for after they are placed in stock their identity is lost. In order that the receiving clerk may do this intelligently he must be supplied with a duplicate copy of the purchase order. Where he does not have such a copy he is bound to accept shortages and wrong goods. The discrepancy may be subsequently caught by the accounting department, in checking its receipts with the original orders, but after the goods have been received and placed in stock it is much more difficult to rectify mistakes and, consequently, it is less likely that any attempt will be made to do so. It is customary, however, to leave off the price which does not concern the store-keeper.

Some suspicious purchasing agents blank the quantity, thus making sure that the receiving clerk actually checks the quantity received. In all cases it is necessary to give the unit of measure, $\frac{1}{2}$ " nickel-plated ells are purchased by the piece, $\frac{1}{2}$ " galvanized ells by the pound; unless the order states which unit is employed the check may be entirely useless, with no second checking possible. Where goods are purchased or issued by weight the stock clerk should be supplied with a scale. This seems obvious yet such simple provisions are often neglected. The best practice is to have two scales, one for heavy weights and one for small, thus securing the maximum accuracy.

Some accountants advocate placing all goods received for whatever purpose in stock and then charging them as issued. This is unnecessary. Where goods are ordered for special purposes it is much more direct to charge them at once to that purpose. The order should specify for what they are to be used and where; so that the receiving clerk may be able to forward them

to the proper department at once, thus insuring a minimum amount of handling and delay.

There are two methods of issuing receipts for goods received. One is to issue a formal receipt to the one making the delivery. This receipt gives the order number, the date when the article was received and a description. A carbon copy is sent to the purchasing department. The second method is to O. K. and return the stockroom copy of the original purchasing order. The second method would appear the better especially in small concerns, in that it reduces the clerical work both in receiving and in checking bills. The practice is however divided. One company, for instance, uses the original order in its electrical department, but independent receipts for its general purchasing.

The second source of supply is goods manufactured for stock. The production order should cover this class without any additional formalities. The third source is unused materials returned by workmen. A credit memorandum should be issued for this class of receipts. They should be distinguished from requisitions by the color of the paper or printing. A common custom is to use red ink for all credit items so as to prevent confusion.

220. *Issuing supplies.*—Tools, as a rule, are easily distinguishable from materials; but they run together in such articles as brushes, files and rubber boots. Although generally considered as tools they are worn out so quickly that many managers invariably classify them as materials and charge them out as such. Each of these three classes of goods—materials, consumable tools, tools—should be distinguished and issued accordingly.

221. *How to use requisitions.*—There are two systems of issuing materials. The first corresponds with banking practice. If a depositor wishes cash at a bank he must issue a “counter check” on the paying teller.

Form F-108 ORIGINAL		REQUISITION No.	FOR DEPARTMENT SUPPLIES				
TO DEPT.		Please furnish the following for Department					
v	Quantity	DESCRIPTION			Weight, lbs.	Price	Amount
1							
2							
3							
4							
5							
6							
7							
8							
Date Wanted	Date of Requisition	Goods Delivered	Entered Stores Ledger	Entered Stock Ledger	Entered Cost Dept.		
If impossible to fill this requisition by the above date notify this department immediately.	Foreman	Foreman					

FIGURE 22.—REQUISITION FORM.

This is the requisition system. The store-keeper issues stores on the presentation of a regular order or requisition signed by any responsible person. (Figure 22.) In office stock-keeping it is often advisable to combine the requisition with the stock ledger by providing columns in the ledger for the name of the person authoriz-

ing issue and the signature of the receiver. This lessens the clerical work and as all office supplies are charged to expense there is no object in charging the items separately.

222. *Bill-of-materials*.—The second method is to issue the materials called for by a bill-of-material prepared by the designing or production departments. This has the advantage of more closely approximating the actual requirements and so conserving material. It assists the store-keeper in keeping up his stock and preparing for future requirements. It lessens the accounting because it eliminates the listing and totaling of many small individual requisitions.

223. *Combination systems*.—Other systems, however, use a combination of the two. The bill-of-material should be the general practice with the requisition as the flexible element to meet emergencies and to offset clerical errors in bills. Some managers think it is better policy to issue material when called for by a responsible department foreman and adjust later any discrepancies between bills-of-material or other specifications and the foreman's statement as to his requirements. Under no circumstances should production be stopped pending adjustment of technicalities as to quantity of material.¹ If a foreman is to be held to results he must be given a certain amount of freedom. Under either method the man actually receiving the materials should also be required to sign for them so that he can be required to explain any over-issue which may occur.

To secure a new consumable tool the workman must return the worn-out tool he has. To get a new brush, for instance, he must return the old one, to get a new

¹ Diemer, "Factory Organization," p. 118.

pair of boots he must return the worn-out pair. This prevents the workman losing his tools and getting new ones from the storeroom, and also gives the purchasing department a basis for judging of the wearing quality of the goods. Replacement of defective materials and issues of materials on account of spoiled work should be made by this method.

224. *Complete and simple system.*—The J. L. Mott Company's tool-room system is complete and simple. Each man is given 12 checks bearing the same number and specially made from a reversed steel die with the firm's initials so as to prevent the possibility of their being duplicated. Each tool in the department is represented by a 3x5 filing card. When there is more than one tool of a kind there are a corresponding number of cards. A two-drawer card index cabinet is used.

In drawer No. 1 the guide cards represent the shelving, bins, drawers, etc., of the tool-room. Behind these the tool cards are placed correspondingly. In drawer No. 2 there is a guide card for each man numbered to correspond with his checks. When a man presents his check at the window for a tool, the check is hung on the check board and the tool card is taken from its regular place, drawer No. 1, and placed back of the workman's guide card in drawer No. 2. When the tool is returned the man receives his check and the tool card is put back in its proper place in drawer No. 1. If tools are broken or lost the card is taken out of drawer No. 1 and after being marked "broken" or "lost" is placed behind a guide marked "broken or lost" in drawer No. 2. Thus the checkboard shows at a glance how many tools a man has and the total number of tools out. Drawer No. 2 shows what tools are in the shop without referring to the shelves.

225. *Single and double check system.*—The simplest method of issuing tools is to give each workman a supply of brass checks, say ten. When the man gets a tool he hands in a check which is substituted for the tool. This is the single check system.

In the double-check system, which is the common practice, each man is represented by two adjacent hooks on the tool-room checkboard. Ten round checks are issued to the man when he starts work and ten square checks bearing the same number are hung on one of his hooks. When he calls for a tool he presents one of his round checks. This is hung on the vacant hook. At the same time one of the square checks is taken off and placed in the tool rack, case or drawer from which the tool is taken. When he returns the tool he is given back his round check, and the square check is taken from the rack, case or drawer into which it had been placed as a substitute for the tool. This system enables the tool-room foreman to tell by the number of round checks hanging on any man's hook just how many tools he has out, but it does not show what tools they are as in the Mott Company's system.¹

226. *Responsibility for remainder on hand.*—In order that the stock-keeper may be held responsible for the stock and tools on hand he must have complete authority. The stock-room must be under lock and key and no one except the store-keeper allowed access. This is essential. Unless he is thus protected, the store-keeper cannot justly be held accountable for the stores. If two men have joint charge, each can blame the other and it is never possible to place the responsibility absolutely. Thus we see separate cash registers in large stores. Each clerk has a cash drawer

¹Diemer, "Factory Organization," p. 159.

of his own and so is responsible for any shortage in his own drawer.

227. *Stock-room protects goods.*—The stock-room must also protect goods from depreciation. Only heavy goods of little value should be stored out of doors and these protected from the weather by sheds or tarpaulins. Finished surfaces should be greased even in the house to prevent rust. The Robert Gair Company, paper goods manufacturers, state that one of the advantages of their new concrete building is that it saves fully \$5,000 a year in vermin losses.

Fire is, however, the main cause of loss and special precautions should be taken, especially for goods of value and all records. Thus in Armour and Company's office building and in other modern buildings there is a built-in fire-proof vault for office records, and in the American Bridge Company's drafting room a fire-proof vault for drawings. This practice is becoming universal. Where records and drawing are not thus protected a duplicate set should be kept somewhere else as an insurance measure.

To prevent goods being kept too long the Watertown arsenal introduced the so-called two-bin system. Two bins A and B are provided for each article. While the goods in A are being used all new goods received are put in B. When A is empty, B is started and new goods are put in A. Thus the material is used in the order of its receipt instead of old material collecting at the bottom of the bin as is the case where new material is dumped in on top of the old. The two-bin system is especially appropriate in handling stationery which yellows with age, so that often the bottom of a pile under the old system has to be thrown out.

228. *Classification by kind.*—Materials should be

classed by kind not by size. For this reason some unit, such as 24 inches, should be adopted and the shelves divided into square compartments. These compartments can then be subdivided as required without changing the shelving. There are two systems of such arrangement.

The way to number bins in stock warehouses is to divide the whole cubic volume of the house into spaces and allot a certain number of spaces to each volume, whether the volume is to contain large or small bins. In this way, no matter what changes or rearrangement in the sizes of the bins there may be, the same number will always designate the same space in the warehouse. For instance, all bins numbered in the ten thousands would represent bins in aisle 10, those beginning with 10,500 representing the bins on one side of the aisle, and those beginning with 10,000 the bins on the opposite side of the aisle. If the bins are large, of course, a great many numbers will not be used. This is practically the same principle that has been finally adopted as the most satisfactory method of numbering houses in city streets, and will be found equally satisfactory in storage and warehouses.¹

The placing of even numbers on one side of the aisle and odd on the other as is done in the numbering of city streets and theater chairs has, however, some advantages over this method.

It is also convenient to place those goods which are much used near the delivery point and those which are seldom used at the back in the storeroom. Where this system is adopted it is necessary to have "finding lists" or card indexes giving the location of the supplies. Where the stock-room is large or there are several floors, it will save time to have several such finding lists located at convenient points.

¹ Diemer, "Factory Organization," p. 114.

The second method is alphabetical by the material or tool symbols. These symbols are marked on the end of the tiers so that any one, even if not familiar with the stock-room layout, can find anything in stock exactly as he would locate a name in the city directory. This system follows the general trend to simplify the work and eliminate the index which is discernible in all lines in loose leaf ledgers, in card systems and in the open-shelf fiction classification of the public libraries. The procedure is the same whether a lead pencil or a blow valve, a box of envelopes or a rough casting is wanted. Of course some kind of a symbol system is a prime requisite.

229. *Size materials when checking.*—The handling of materials is facilitated by the sizing of materials the first time they are checked and so eliminating the need of doing it again. The Salford Rolling Mills, Manchester, paint the weights on all castings when they leave the foundry. The Thompson-Starrett Company paint the length of all heavy timber on both ends so that one can tell just what is in the yard by looking at the ends of the piles. Some companies indicate the kind of steel by painting one end a certain color. The Tabor Manufacturing Company of Philadelphia paint their bolts, washers, clamps, etc., used in setting up work in machine tools, bright colors, such as red, blue, green, etc., which immediately designates them as tool equipment. Adequate hoists, tool boxes, etc., for handling the material should be provided.

230. *Stock ledger and inventory-taking.*—The actual stock ledger is usually kept in the dispatching or planning department to facilitate routing. Where the system of dispatching has not yet been introduced, the

stock ledger is usually kept in a card or loose leaf ledger.

Standard designs are carried in stock by most of the manufacturers of loose leaf and card systems. A useful stock form of the C. E. Sheppard Company is shown in Figure 23. The sequence of the items varies in different companies. C. B. Cottrell & Sons place the balance between the received and delivered columns. C. W. Hunt Company place the order number after the amount delivered but before the balance on hand. The Wells Brothers Company provide separate date columns.

In order to verify the stock on hand, the balance-of-stores clerk spends an hour a day in the storeroom checking up. Each day he takes a certain number of items and counts and weighs them, comparing the results with the figures on his sheets. To go through the whole stock-room requires six months, so that during the year two full inventories are taken.¹

Another method is to check each article when the quantity on hand is low and so involves a minimum of work. Slight discrepancies are bound to occur, because the fallibility of the stock clerk is far more common than the infallibility of records. When these discrepancies are marked or appear as continual shortage in the more valuable materials they should, of course, be investigated, but in general they should simply be written off. In either case, that bugbear, the annual "taking account of stock," is entirely unnecessary.

231. *Provide a surplus of the less expensive.*—If two men are mutually dependent upon each other, the less expensive must wait upon the more expensive. The-

¹ E. M. Woolley in *System*, June, 1911.

oretically it should be possible for them to exactly tie into each other. Practically it is not so. Unless the cheaper serves the more expensive, the more expensive man or machine will do the waiting. For instance, if men are loading trucks with dirt, it should be possible to proportion them exactly so that one truck would drive on to be loaded while the one ahead was driving away full. As an actual fact it is not possible and under such circumstances the men will be waiting for the trucks or the trucks will be waiting to be loaded or both will be waiting for each other during different parts of the day. It is therefore necessary to decide which of the two is the more expensive, and supply either enough men to keep the trucks moving or enough trucks to keep the men busy.

This applies throughout business. If the man's time is more valuable than the material used, he must be given a leeway, otherwise he will have to adapt himself to the material. If the material is more valuable than the man's time, he must adapt himself to the material, otherwise he will waste it. This is the case in gold-smithing, and the workbench is laid out, not to convenience the man, but to save the gold filings. This reasoning applies with special force to office work. If an executive's time is worth more than a clerk's he must be supplied with a sufficient clerical force, otherwise he will be doing the clerical work himself at the expense of more important work. The less expensive must wait upon the more expensive.

232. *Small savings.* — Manufacturing and other forms of business at some time meet a stage in their development when their profits, so far as these depend upon the cutting of their costs, must be made through small economies. Transforming industries are similar

to agriculture, mining and lumbering in that they, too, have their day of big profits which were made through an extravagant use of materials, new machinery and cheap power. But a time comes when the factory or store must be worked as intensively as the farm. "The Gleaners" as pictured by Millet represents not merely a laborer toiling but an economic condition which demands that no head of grain be wasted. The time has likewise come in our American factories, mills and business homes for the appearance of "The Gleaner." The by-products, the scrap-pile and the ash-heap must be made to contribute to success. The steel plant at Gary is described as "the result of a thousand short cuts."

In some offices every employé is required to tear each memorandum before throwing it into the waste basket so that no one will lose time in taking it out to see if it contains valuable information. Machine time has been saved because its work has been facilitated through a careful study of the chemical composition of the metal on which it worked and castings have been reduced in size to save the machine in finishing them. Designing apprenticeships are no longer solely confined to the office. Out of a seven years' training four years are spent in the shop. Designs must be made to meet commercial conditions. One of these is composition. The designer must keep the element of cost in mind. He must effect a saving if he can.

233. *Office work.*—Office work, as a rule, is particularly open to savings by reduction in the time required. Many superintendents keep an extra timekeeper to figure costs for the week. These same costs are often figured in the main office for the higher executives; thus two men are paid for doing the same thing. One or the other is clearly superfluous. The results worked out

for any one man in the office should be in such form as to be available for his own future use and for all others wishing the same information.

In estimating haphazard methods are no longer allowed, but the computations are carefully worked out in books. When it is desirable to verify the results, it is much simpler to check the computations than to re-do them as would be necessary if done on scrap paper. Moreover, the chances of locating errors are greatly increased.

The perpetual inventory system of bookkeeping by which the balance is brought down after each entry is another illustration. Apparently, this involves additional labor. The saving results from the fact that the balance is taken once instead of every time one has occasion to refer to the account as formerly and the pencil figuring so common in the old-style ledgers is given a column and done systematically.

The time consumed in "hunting" for things is a pure waste. Pigeon-hole desks, deep drawers, disorganized stock-rooms are decidedly out of date. A place for everything and everything in its place is a great time-saver.

Another step forward was the elimination of the index. With the modern loose leaf and card ledgers, bookkeepers are able to turn directly to an account instead of first looking up the page in the index. Encyclopedia filing also has this great advantage over the numerical system and is in general much to be preferred. The slogan of the adding machine advertisements is, "We can get your monthly trial balance off three days sooner," or "You can go home at six o'clock instead of eleven." The gain effected by most other office appliances is a saving in time.

234. *Unnecessary shifting involves loss.*—Shifting from job to job is a form of wasting time as common to the office as to the shop. Not only does the moving from place to place take time, but there is always a certain amount of preparatory work, the shifting of papers, the arranging of materials, the changing of machines which must be re-done every time a change is made. The wisdom of our ancestors has become the rule of efficient organization, "Don't make two bites at a cherry." Where shifting of large gangs is unavoidable, as on construction work, their change should be made if possible at noon or the men instructed to report at the new place in the morning. This takes advantage of the natural breaks.

This principle applies to all labor paid for by the week. Mr. Frank Gilbreth's manual states that all foremen and others paid by the week are to mend tools, clean stock-room or to be employed in some similar way on rainy days. Most office employes fall in this class. In many seasonal businesses the better part of the office force have nothing to speak of to do for three or four months at a time. As much work as possible and vacations should be thrown into these slack periods. When work of minor importance comes in it is well to list it and keep it until such time as the regular work is light. In enforcing this rule, it is well to remember, however, that if straight time men are allowed nothing for working over-time in a pinch, it is only fair that they be allowed compensating time off when things are slack. Even where men are employed by the hour, it is better if possible to keep them working on fill-in work, because much broken time causes dissatisfaction, the better class of men drift to where they can earn steady wages, and those left "soldier" whenever possi-

ble to prevent running out of work and being laid off for a time.

235. "*Fill-in*" work.—The same principle applies even more forcibly to the use of equipment, for equipment cannot be laid off during slack times. In a machine shop, certain equipment is absolutely necessary even if the quantity of work is not sufficient to keep it busy all the time. In such shops, it is cheaper to use these machines during their otherwise idle time on some classes of work for which they are not especially fitted, rather than to buy other specialized machinery which would do the work more efficiently but which would also be idle part of the time. This has led to the custom of fill-in work. The planning room keeps each machine working on that class of work for which it is best fitted, but when there is none of that class of work in the shop to assign to it, some other class for which it is not especially fitted, but which it can do, is assigned to it.

To conserve time by utilizing every minute, steel mills, mining operations, foundation works and many other activities which are run under heavy expenses work twenty-four hours a day, seven days a week. In outdoor work during the summer, it is usually light enough to run two eight-hour shifts, one from 4 a. m. till noon, and the other from noon till 8 p. m., without artificial light.

Two-way hauling is another illustration. It takes practically as much time to come back empty as to come back full. Contractors count on this in making prices, and will figure much closer if there is a load of sand one way and a load of rubbish the other. Companies shipping west can usually get better service, because there are always empty cars going west which the roads are anxious to fill.

Power companies often find it economical to make special rates for consumers who agree not to use any power during the time of the peak load on the plant. The peak load determines the maximum the company can contract to supply even though during the rest of the day the plant will be running below capacity, and they, therefore, can readily offer a better price to stimulate the demands at times of low ebb for capacity which will otherwise be wasted. Such low priced power is in the nature of fill-in work.

Many companies make a practice of manufacturing an "understudy product" or contracting at cost prices to carry them through financial flurries, not with the idea of making a profit but in order to keep even. Narrow markets may mean ruin; narrow markets combined with a narrow product place one at the mercy of every passing gale. A manufacturing concern that makes a very heavy steel product has a line of light metal goods that go to wholly different markets. During the last financial disturbance the main product was cut off absolutely; but at such times the world does not stop running. This concern's foundry and machine shops were kept sufficiently busy on the secondary product to pay the fixed expense on the whole plant.

Lesser savings are also often possible in the machines themselves. Many cutting tools are found on examination to be cutting air from one-half to three-fourths of their stroke, thereby taking from two or three times as long as necessary. Improvements in machinery and methods such as the Taylor-White high speed steels are continually reducing the time taken to do a job.

236. *Waste motion.*—In ordinary business practice much of the work is waste motion. Most of the actual work in foot pounds done by a bricklayer is consumed

in lifting the brick and mortar from the scaffold to the wall as with each stooping he must lift not only the brick but the weight of the upper part of his own body. If the scaffold could be so arranged that he would lift the bricks *down* instead of *up*, so that he employed the force of gravity instead of working against it, he could set many more bricks a day and still be less tired at night.

Imperfect work is a common cause of waste material, for usually not only is the time and work spent on the piece wasted, but the piece has to be scraped. Careful inspection is essential to economical manufacture. Imperfections due to workmanship should never be paid for, as the practice encourages carelessness. Cutting to the best advantage is probably the most fertile field for saving material. A piece of goods will go much further when the patterns are dove-tailed into each other. The old-fashioned buzz and gang saws wasted as much as one-eighth of the lumber in sawdust. It is only recently that lumbermen have begun to cut on the ground level instead of waist high thus saving the stump. Working capital can often be scaled down by carefully limiting stock and credits which is cutting capital to the best advantage.

237. *Using supplies a second time.*—The 2c rebate on the delicatessen bean pan and the \$1.75 allowed for the return of the Standard Oil's "holy blue barrel" and the 10c for the return of a cement bag show like recognition of the importance of using the same material twice wherever possible. Some unions oppose this and have had laws passed forbidding the second use of cigar boxes.

It is well to visit the scrap heap occasionally. All old bolts should be collected. An old man in some out-

of-the-way corner of the shop with an anvil and hammer can straighten these, after which they should be carefully sorted and used again. If the threads are rusted or broken they can be cut off and re-threaded.

By-products are probably the most important method of utilizing materials. Cement from iron furnace slag was first made because the slag accumulated so fast that disposing of it was expensive, and chemists were given the job of finding out what could be made of it. A by-product is a product manufactured to utilize certain inseparable parts of the raw materials of the main product which would otherwise be wasted. Thus gas is a by-product of the iron industry and coke of the city gas works. The extent to which by-product utilization is carried by large firms is exemplified by the case of coal tar products which shows that 103 products are made from coal tar, the residuum of gas and coke works. The Standard Oil Company in addition to making 220 grades of kerosene, naphthas, benzines, and gasolines make 994 different kinds of paraffines, waxes, candles and greases from the residuum. Where the residuum is not large enough to justify the expense of utilizing it, it can often be sold as it is. The retail butchers find it more to their advantage to save and sell their fat than to make soap; and the great United States Steel Corporation finds it better to sell coal tar than to work up the 103 products into which it is eventually made.

CHAPTER XII

OFFICE METHODS

238. *Function of the office.*—In its usual sense the “office” is the part of a business establishment in which the administrative and clerical work is performed. That is to say, if the vice-president happens to have charge of the factory, his headquarters are said to be “in the office.” The sales manager’s, advertising manager’s, treasurer’s and accountant’s departments are also regarded as parts of the office. But for our purpose—that of laying down basic principles in the management of the office—we must adopt a different point of view.

It has already been explained that, generally speaking, a business is divided into four basic departments—the production department, the sales department, the financial department and the accounting department. Each has its own specific functions to perform. The production department supplies the article to be sold, the sales department is concerned in selling it, the financial department collects and disburses the money involved in the conduct of the entire business and the accounting department records all the transactions, summarizes the facts and presents the results in statements and reports for use in further operations. The office, as we shall have to regard it, performs the clerical work required by these four departments. In the production department, records of orders, of quotations, of invoices, of stock, of requisitions and the like are constantly needed. The whole attention of the factory

superintendent or manager should, theoretically, be devoted to the efficient production of goods. This calls for the use of all his skill and ability in the handling of machinery, plant, men and materials. He is only interested in the clerical work as an aid in the performance of his duties. When about to purchase a new machine, for example, his interest lies, not in how the quotations are filed, but in the bids themselves. Or if the factory manager is uncertain as to the specifications on an order going through the plant for one of the customers, he wants the original order when he calls for it. He does not care how that order is found, but only that it is brought to him promptly.

Again there are sales records and statistics, follow-up files, prospect lists, clippings, electros and other data of this kind which must be cared for. The sales manager, like the factory superintendent, is supposed to give his whole thought and attention to increasing sales. It is necessary that the sales records be reliable and on hand when wanted. Farther than that, the sales official's interest does not go.

The financial department also has its records, such as credit information, list of delinquents, and the like, upon which it relies in conducting its operations. The accounting department requires sundry clerical work, such as billing, filing vouchers, etc.

In addition, the four departments referred to receive and send out mail which must be typewritten, filed and otherwise handled. There are other details incident to the routine of every office, such as the operation of duplicating, addressing and other machines, attending to callers, errands and inter-office communications.

All these details fall within the scope of the office proper. From a management point of view, then, the

office may be defined as that part of a business organization which performs the purely clerical work necessary in the conduct of the whole business.

239. *Elements of management applied.*—The same cardinal elements of management discussed in previous chapters are present in the management of the office. In other words, we face the problem of directing forces or energy toward the fulfillment of a purpose. There are both kinds of energy—human and machine. The *purpose* of the office is to provide the clerical work necessary in the conduct of the entire establishment. To perform this work expeditiously and efficiently is an element in the profit-making of the concern in the same sense that increasing sales or reducing the cost of production is also an element.

The first step should be a study of the work required of the office, as we now understand the term, and an analysis of the amount of energy available. To put the matter more concretely, we may compare the office manager's work to that of a contractor about to build a school-house. His plans and specifications are laid before him. He knows what is wanted. He knows, too, that he has so many men, so many dummy engines and so on. The men and engines represent a given amount of energy which the contractor measures by the amount of work they can perform. A brick-layer can lay an average number of bricks a day; a forty horse-power engine can move an average number of loads a day.

The office manager, in a similar manner, ascertains that he has five, six or more departments to serve. Each department requires certain services which are approximately determinable. These services are the "results" required of him. He studies the people on his force

and the mechanical appliances at his command. The efforts the two put forth represent the energy under his control. He, too, measures energy by results. That is to say, a typist is capable of turning out, say, 900 lines a day; a duplicating machine will produce say 35,000 form letters a day.

Knowing what the office is capable of, with its present equipment of people and machines, it devolves upon the office manager to determine whether the existing standards are sufficiently high and where possible to raise the standards through the introduction of new methods or a better grade of help or through reorganizing the work where reorganization is required. This, really, is the axis around which all the office manager's duties revolve.

240. *Office head.*—The term “office manager” has been used above. Since the duties properly within the scope of the office may be separated from other duties and since the management of the office may be considered as a separate function, it would seem that there should be an official who is specifically responsible for its efficient conduct. Theoretically this is true and in many large concerns, such as the Westinghouse Air Brake Company and branches of the United States Steel Company, there is actually such an official. In the majority of cases, however,—particularly in medium and small concerns,—this duty is either divided among a number of department heads or is only one of a number of duties assigned to an officer also in charge of some other branch of the concern's activities. This feature is considered in a later section of this chapter. It is desirable, before proceeding, to inquire into the necessary qualifications of the person or persons who are charged with governing the office.

We have seen that the office proper is in close touch with every department in a business establishment. As a matter of fact, it is an essential to the efficient conduct of these departments. What would be easier, for instance, than to frustrate an important plan for increasing sales by neglecting the clerical features of the plan? Or if the financial department were contemplating a special campaign to stimulate collections during a usually "slow" month, the person in charge of the clerical work, failing to comprehend the importance of the movement, might easily cause a loss of several thousand dollars by postponing attention to certain details in favor of "more pressing things to be done." It is highly desirable, then, that there be complete harmony between the office and all the departments.

There is a corollary to this conclusion. The persons in charge of the office must be thoroughly familiar with the purposes and policies of all the departments and must be fully aware of the import of almost every move that is made involving clerical work. This will hardly be possible unless these persons understand the principles that underlie the conduct of business generally. What the sales department is for and how it operates and the design of the work in the production, financial and accounting departments is important knowledge to the office head. He should also, of course, be thoroughly familiar with the subject of organization and management and should be in touch with all the modern office methods and devices. In addition he should possess the natural qualifications of any leader. Tact, precision, sympathy, forcefulness and a keen, accurate perception of the details of problems presented for his decision.

241. *Selecting and handling employés.*—The prob-

lem of directing the office force so that it will work harmoniously and with maximum efficiency is one of the hardest to solve. Unlike the manufacturing end of the business, the employés of the office cannot be placed upon a strictly scientific management basis. The work is too varied, requires the exhibition of more individual intelligence and is dependent upon too many indeterminable factors. Yet the principles of efficiency are as capable of application in the management of an office as they are anywhere else.

It is important, first of all, that proper care be given to the selection of employés. The fourteen-year-old applicant for the office boy's position should be a future executive. He should be examined with that end in mind, and his physical and mental characteristics should be carefully studied. During the last few years much progress has been made by such people as Dr. Katherine M. H. Blackford and Dr. Winthrop Talbot in establishing scientific physical tests. Some of the large concerns have installed medical departments for this sole purpose. The education, home surroundings, and future ambition—all of which may be determined by discreet questioning—are also important barometers in judging the capability of a person to perform the work to which he or she is assigned and of advancing the employé to a more important position.

One of the large electrical companies places so much importance upon an employé's advancement that it has laid down this definite rule. Each year during the first five years an employé must either be worth an increase in salary or must be dismissed upon the ground that he is not made of the right kind of material. It is said that this rule works out excellently in practice, though there is some doubt as to whether its inflexi-

bility, especially in so large a concern, does not work considerable harm.

There is not sufficient space to dwell upon this feature at length. Suffice it to say that the selection of the right kind of office employé is essential to the successful management of any office. Some concerns, notably Ladenburg, Thalman & Company of New York, have definite application blanks, methods of investigation, and so on, for this purpose.

Coupled with the selection of employés is the importance of assigning to them the duties which they are by nature best fitted to perform. This is almost obvious, yet how many clerks are at the billing desk when they should be order clerks or entry clerks? In cases where there is an original examination such as has just been discussed, it is only a matter of carrying the process one step farther and determining what qualifications are necessary to perform a given kind of work. In the mailing department of one of the large publishing houses, for example, it has been established that an active, nervous girl can turn out more work than a calm, self-contained girl, even though the later may move decisively.

The welfare movement in factories is being applied to offices as well. In many of the large companies, like the Metropolitan Life Insurance Company and The American Telephone and Telegraph Company, light, airy lunch rooms where wholesome food is tastily served at low prices are provided. The National City Bank of New York, Spencer Trask & Company, and other large companies have provided club rooms, libraries and recreation rooms where office employés may gather after office hours and listen to lectures on business subjects, discuss outings and so on. All these

movements should be encouraged and aided by office managers and by the heads of concerns. They stimulate loyalty, cooperation and an interest in each other which in the long run expresses itself in an increased interest in their work.

242. *Establishing standards.*—It was stated above that office work does not lend itself well to scientific management. Yet it is possible to establish standards and by means of the reports discussed in the chapter on “Office Systems and Reports” to determine the efficiency of employes. Marshall Field & Company of Chicago, the Simmons Hardware Company of St. Louis, and other concerns have, for instance, placed their typing departments upon an efficient basis in this manner. By means of a register which records the number of strokes on the typewriter keys they obtain a fairly accurate record of each girl’s output. In other cases the number of lines (of a given length) or the number of words are counted by the chief of the typing department. The following is a sample of a week’s record in one of the concerns which uses the line method of calculation. The high records were made by operators on dictating machines turning out standard paragraph letters while the lower records were made by beginners or girls on difficult dictation. The initials in the top row indicate the correspondents who dictated during the week; the names of the typists appear in the left-hand column:

	TAT	LRS	BMO	FL	BL	EWC	MHE	HT	COPY	TOT.
Miss Smith...	270	670	585	.....	750	.....	1,065	60	1,240	4,640
Miss Jones....	85	...	4,900	.....	...	.....	145	95	415	5,640
Miss Brown...	...	...	310	4,870	...	.....	590	...	300	6,070
Miss Richards.	...	...	.....	250	...	3,900	150	...	1,545	5,845
Miss Hart.....	...	...	655	850	...	.....	420	...	2,040	3,965
	355	670	6,450	5,970	750	3,900	2,370	155	5,540	26,160

These records form the basis of a bonus system. Any

such bonus system must necessarily be elastic and more or less arbitrary. In this particular case the committee which awards the bonuses takes into consideration the number of lines, the nature of the work and the accidents and other delays reported. The operators cannot tell in advance just what their bonuses, if any, will be. Their reliance on the fairness and judgment of the committee makes the system effective, however. In addition the figures posted on a bulletin board arouse a friendly competitive spirit.

Many large concerns have discontinued bonus and piece-work systems in the office. The American Law Book Company of New York tried a piece-work system but gave it up. So did the Sears-Roebuck Company of Chicago. At one time five hundred clerks in the entry department in this company were paid on a piece-work basis, but the plan was found impracticable.

243. *Military type of organization.*—There are three types of office organization: first, the military type; second, the functional type; third, a combination of the military and functional types which may be termed semi-functional. In the military type, which is the most common, the head of each department controls all of the work that is performed in the department, regardless of its character. The sales manager, for example, is provided not only with assistants for writing to salesmen, for handling mail order work and for other purely sales activities, but in addition has his own stenographers, typists, statisticians, file clerks, mail clerks and errand boys. The sales department, under these conditions, becomes practically a business office in itself. On the one hand, it is credited with sales and, on the other hand, it is charged with its expenses. This is an easy method of determining the exact ratio of sales expense

to income. As has already been pointed out in an earlier part of this book, however, the military form of organization is obviously inefficient. The sales department is forced to perform functions entirely outside its scope. The selling type of mind is different, as a rule, from the type needed for the efficient regulation of routine.

The same basic objections apply to the military form of organization in the other departments.

244. *Functional type*.—The separation of strictly office work from the functions within the scope of the sales, production, financial and accounting officials is similar to the change which takes place in the factory organization when the functional type is substituted for the military. The duties of the gang foreman in the latter case are distributed among a number of functional foremen, each with his own special duty to perform. In the office, the department heads confine their energy to selling, manufacturing, financing and accounting, as the case may be. The specialized function of managing the office is turned over to a person trained for this duty. Frequently we find an officer—usually the accountant—performing the dual task of running an office and one of the four departments. While this arrangement is sometimes expedient, especially when a concern is not large enough to warrant the employment of an office manager, it does not conform strictly to the accepted idea of a functional organization.

When the functional idea is in force it is carried out, so far as possible, throughout the entire office organization. Except in cases where there is not enough work to keep a person busy, one specific task is assigned to each employé. Functional organization is illustrated in Figure 24.

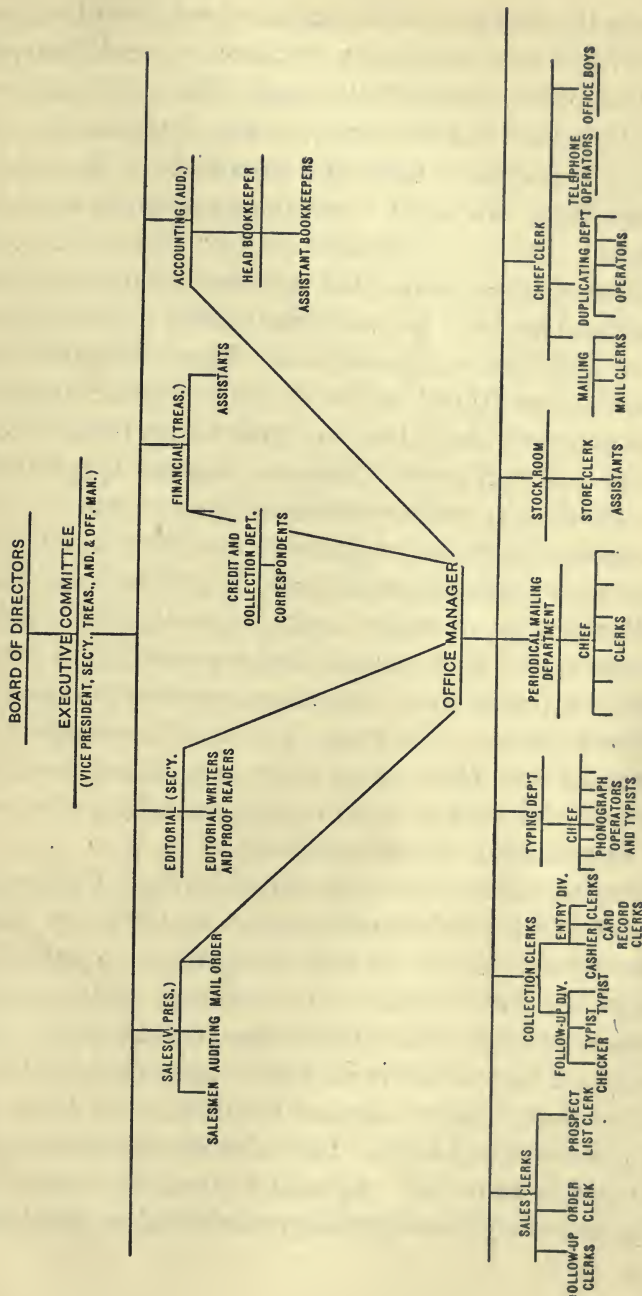


FIGURE 24.—ORGANIZATION CHART OF A PUBLISHING HOUSE.

During the change to the functional scheme of organization in this case numerous instances were discovered where one clerk could do the work that two had formerly performed. The office, in this organization, is a separate department directly responsible to the executive committee. It is not a sub-department of any one department, but a sub-department of them all. All the clerical work is under the supervision of the office manager and he has his subordinate chief clerks, whose duties are still further specialized. The functional idea is carried to its fullest point in the collection department where each clerk has one task to perform. One checks bills, receipts and addresses, another types form letters, another enters remittances, and so on.

245. *Semi-functional organization.*—We frequently find an office organization almost on a functional basis but still adhering in minor respects to the old scheme of management. For reasons that are good, the various departments retain their own stenographers and one or two special clerks. The work may be of a confidential character or the clerk may need specialized training that can be obtained only by closely attending the head of the department or his assistants.

The organization of the office in the White Company, Cleveland, Ohio, manufacturers of motor cars, is of this character. In the White Company, the sales department is in two divisions, one in charge of the second vice-president, the other under the jurisdiction of the secretary. The auditor is also office manager but various sales departments and sub-departments have retained some clerical help. The advertising department is a typical example. Specially trained clerks are usually necessary in advertising work and we find that

special stenographers and clerks are assigned to this department.

246. *Committee system.*—The committee system is employed in the office with excellent effect. In Figure 24 it will be seen that the office manager is a member of the executive committee. The value of this arrangement is evident when it is remembered that the force he controls is in constant attendance upon the departments of which the other members of the committee have charge. Through the committee meetings the office manager keeps in touch with the plans and policies of the various departments, and is thus enabled to direct his force with an intelligent regard for the work which should take precedence over other work. Here, too, he learns of the shortcomings of his force, receives suggestions that add to its efficiency and imbibes the spirit of the entire organization, which in turn he communicates to his department heads through an office committee. The office committee is composed of the office manager and his chief clerks. The frequency of the executive committee and office committee meetings depends upon the nature of the business. The former usually meets more frequently than the latter. There is a danger in carrying the committee system too far, just as there is in not carrying it far enough. The routine of the day should not be broken any more than necessary; it is often advisable, in fact, to hold meetings during the lunch hour or on Saturday afternoons.

247. *Suggestion system.*—The suggestions offered by office boys and other minor employés frequently surprise even the most ardent advocates of the suggestion system. The usual plan is to offer two or three definite money prizes for the best suggestions turned in during

a given period, say one month. The suggestions are unsigned, a copy being kept by the author. They are deposited in a box designed for that purpose or are laid on the desk of the office manager. Either the executive committee or the office committee passes on the various suggestions submitted and awards the prizes, posting the winning suggestions on a bulletin board. The contributors then submit their copies, receive the prizes and their names are written on the posted documents. Suggestions such as providing a motor for a hand-driven device, reducing the sizes of various pieces of stationery to avoid folding, pasting carbons to letters instead of pinning them thus saving space in the files and cost of pins or clips, and ideas of this sort are the more common. Very often, however, advertising and selling ideas and suggestions of similar importance come from the most unexpected sources.

248. *Arrangement and lighting of office.*—While this subject might properly be treated under the head of organization it is, nevertheless, an important element in the management of the office and may well be considered at this point.

The arrangement of desks, filing cabinets and other equipment depends much upon the type of organization. Under the functional type where the filing is concentrated in one department, where the typists are gathered under one chief and where the other functions are similarly segregated, it is obvious that the equipment is grouped according to the departments. The problem then becomes one of allotting the proper floor space and position to each department. The general principle of progression forward should be adhered to so far as possible. It is usual to follow the course taken by the orders received. This is illustrated by the floor

plan of the office of a large clothing house in New York (Figure 25). The orders are first laid on the president's desk. From there they go to the credit de-

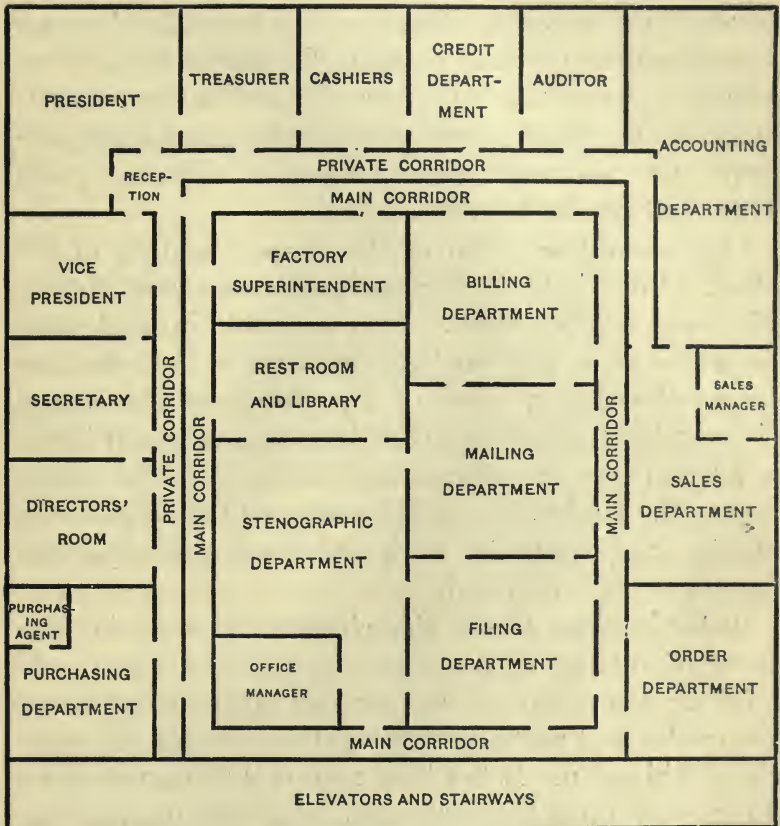


FIGURE 25.—FLOOR-PLAN OF OFFICE IN NEW YORK CLOTHING ESTABLISHMENT.

partment and when the sales manager receives them he knows whether or not they are approved by the credit department. After his approval they proceed to the order department where the production orders are made and the proper copies sent to the filing department for the sales and other files, to the billing de-

partment and to the factory superintendent. The latter is not far distant from the purchasing agent with whom he is in frequent communication. The treasurer is located close to the credit and accounting departments. The shipping slips come up from the shipping department on the floor below to the billing department which is across the hall from the accounting department. The filing, mailing and stenographic departments are also conveniently located. There is very little doubling back in this office.

Care should be given to the proper lighting of the office. Poor light is responsible for much of the inefficiency in office work. It is advisable in most cases to call in an expert on lighting, because the work has been reduced to a science. In some cases it is found cheaper to install an indirect lighting system; in others a direct, properly diffused light is better. The candle power, the kind of shades, the distance of one light from another and from the work—all these are important factors to be considered.

249. *Conclusion.*—In this chapter the essential features of managing an office have been treated only briefly. Much more might be said on the subject but the reader will undoubtedly be able to apply the principles laid down. It has been seen that these principles differ very little from the principles that underlie the whole problem of management. Proper organization, intelligent handling of the forces under the office manager's control with an eye always toward results, the adoption and use of higher standards and better methods and finally a regard for the comfort and surroundings of his employés—these are the main problems of the office head.

QUIZ QUESTIONS

(The numbers refer to the numbered sections in the text.)

PART I: BUSINESS ORGANIZATION

CHAPTER I

1. What is the meaning of the word "Organization," as applied to business?

2. What did the early economic man lack in order to make his labor effective?

3. What relation has surplus wealth in various communities to commerce?

4. How did the proportion of capital compare with labor in the period of the town economy?

5. How did specialization affect the industrial development of the town? How did the growing demand for goods affect the organization of the guilds?

6. Why is the handicrafts system sometimes characterized as a system of custom production?

7. From what point of view is industry regarded when its organization is referred to as the domestic system?

8. Describe the conditions under which the middleman made his appearance. Point out several things which show how industry was gradually changing its organization in the latter part of the Eighteenth Century.

9. What was the chief function of the manufacturer during the latter period of the domestic system? Why

was it that business men were seldom ruined completely during a financial crisis? What economic argument did the parliamentary committee offer in justification of the merchant's position?

CHAPTER II

10. What is the problem of each nation relating to the disposition of the industrial surplus? What principle governed the colonial policy of nations in the Eighteenth Century?

11. What was the first great gain in cheapening production? Name the consideration which may counter-balance the technical efficiency of machinery.

12. What were the essential elements in the change from the domestic to the factory system? What effect did machinery have upon the methods of labor?

13. Under what conditions did the partnership form of organization originate? Name the advantages of the corporate form over the partnership form from the point of view of business organization.

14. When did large-scale production become the prevailing type of industry? Name the largest corporations in the United States.

15. In what four directions has the division of labor manifested itself? Illustrate by reference to some modern industry the great savings that are being made in the cost of production.

16. What characteristics pertain to the territorial division of labor?

17. Why are specialization and coöperation closely associated?

CHAPTER III

18. Into what two phases may business be roughly divided? Describe the simplest form of market.

19. What peculiar feature is there in connection with the Antwerp grain market?

20. Market prices are the resultant of what influences?

21. What is the function of the speculator, the jobber, the broker?

22. How does the handling of raw materials differ from the distribution of manufactured products?

23. Why does speculation associate itself with the markets for raw products more than with the markets for manufactured goods?

24. What are the chief points pertaining to the custom of "set off" in the decision of the Supreme Court of the United States, May 8, 1905?

25. Into what two parts may a market be divided?

26. Why is grading of a material necessary in order to establish a broad market?

27. Why is the warehouse receipt an important document in the grain trade?

28. What is a contract grade of wheat? Why should an inspector of goods by whose decision a grade is established be closely watched?

CHAPTER IV

29. Name the various interests which use the Chicago Board of Trade as a market place in buying and selling wheat.

30. What is the business purpose of the corporation

known as the Chicago Board of Trade? What are the two principal kinds of transactions on the exchange?

31. What are the chief sources of orders which are received by the brokers in the future markets?

32. Define hedging. Point out the difference between a hedging and a speculative operation.

33. What economic argument is there in support of the future trading in the wheat markets? Define the hedging operation as conducted by an elevator company.

34. Describe the course of an order.

35. Into what two classes may pit traders be divided?

36. Describe the method of payment employed in the Board of Trade.

37. What is meant by the expression "trading on a margin"? Show how the method of "ringing out" obviates the necessity for a clearing house.

38. Why is a clearing house system necessary in connection with the Board of Trade?

39. Name the chief produce exchanges of the United States and Europe. What is the duty of the committee on arbitration? Name four rules which protect the traders.

40. What influence have the telegraph and the Atlantic cable had upon the organization of the market?

CHAPTER V

41. Why was the Manchester cotton goods exchange organized?

42. What reasons are impelling the manufacturer to strengthen his control over the market? What form of association is represented by the Central Thread Company?

43. Describe the agency method of selling. Outline the method employed by the American Tobacco Company in disposing of its product.

44. How may the method of transportation influence the system of distribution? What special cause induced the large iron and steel manufacturers to eliminate the middleman?

45. Name some factors affecting the selling methods in the textile industries. State two reasons for the strong position which the commission men hold in these trades.

46. What drawbacks has the mail-order method in the United States and England?

47. Why does not the manufacturer of sugar establish his own retail stores? What motives led the American Tobacco Company to establish retail stores? Show how a company has rapidly extended this system of selling.

48. Outline the chief reasons for the declining importance of the middleman.

CHAPTER VI

49. What part has private enterprise taken in the building up of the foreign export business?

50. How does the American manufacturer look upon industrial expositions as a means of introducing his goods in other countries?

51. Outline the methods by which a manufacturer should approach the subject of exporting.

52. Why are clearness and simplicity in foreign correspondence essential? What cautions should be observed in compiling catalogues?

53. What advantage has a graduated scale of prices

over a quoted price? What caution should be observed in quoting prices C. I. F. and F. O. B.?

54. What is the economic function of the commission man?

55. What cautions should be observed in dealing with commission houses?

56. In what way can a foreign importer guard against substitution on the part of the export commission house?

57. What is the "bonus" evil in connection with the export commission house?

58. Name four methods used by manufacturers to put goods on the market.

59. What are "jobbing houses"?

60. What is generally the attitude of the American exporter toward the foreign commission agent? What method should be employed in arranging the financial settlement when goods are sold through such agents?

61. What is said about personal representation in foreign markets?

62. How do manufacturers located far from the ports keep in touch with the export conditions?

CHAPTER VII

63. What is the chief function of the consular service?

64. What influence is the industrial activity of Germany exerting on our consular service?

65. What system of consular appointments was inaugurated in 1906?

66. What is the range of the salaries of consular officers?

67. What is the character of the consular reports?

Of what importance are such reports to the American foreign trade?

68. How have the consular reports helped the United States to introduce new goods into China? Why should Americans study the styles and prejudices of foreign countries?

69. What is the custom among foreigners in regard to credits?

70. Why is it important that strict attention be paid to the packing of goods for the export trade?

71. How does the government discriminate in favor of its own citizens in the matter of trade information?

72. How do the consuls aid in the protection of the customs revenue? In what direction should the consular service be extended?

CHAPTER VIII

73. In what two directions has the manufacturer attempted to reduce his costs?

74. Why is capital said to be fixed when it is invested in a manufacturing plant?

75. What important factors must be taken into consideration in predetermining business enterprise?

76. Why should a factory be placed as near as possible to the source of the raw material?

77. Why should it be near the source of power?

78. Discuss the labor market.

79. Discuss the factory's output.

80. Discuss transportation facilities and the relation to factory location.

81. Why are the physical surroundings of importance?

82. In the reorganization of an existing plant, what important considerations may arise?

83. What advantages has a country site over one in the city? Describe the storied and the scattered types of manufacturing plants.

84. What important principle in connection with future expansion should be kept in mind in designing a modern plant?

85. In providing for the transmission of electrical power within the factory how is the machinery often grouped?

86. Why should standard equipment be installed as far as possible? What kind of tools prove to be the most economical in the long run?

87. What idea should be kept prominently in view when providing for transportation within the plant?

88. Discuss the conveyance of information.

89. Make a list of the various preliminaries in preparing to manufacture a certain product.

CHAPTER IX

90. On what basis should men be selected for positions of authority?

91. Make outlines showing the various divisions into which the following functions of a manufacturing business may be divided: controlling the supply of stock, purchasing, testing, employing, selling, warehousing, transporting, maintenance, improvement, construction, executive, administration. What data should be gathered by the recording department in connection with the employment of labor? What department fixes the price at which goods can be sold to make a profit? Why is it important that the maintenance and manufacturing

departments be consulted before any extensive improvements are made in building or equipments?

92. Give a list of typical duties pertaining to the following officers: president, vice-president, secretary, treasurer, general-manager.

93. What is required of a foreman under the military method of organization?

94. Describe the organization of the planning department.

95. What are the chief foremen connected with this department and what are their duties?

96. What are the duties of the shop bosses?

CHAPTER X

97. Make a sample form which may be used by a salesman in sending an order to the factory.

98. Why is it good business policy to keep the drafting department in close touch with the shop? Why should all drawings be OK'd by the shop foreman before they are placed in the shop?

99. In order to determine the efficiency of the tool room, to what important tests should it be subjected?

100. What advantages are there in the separation of the management from the factory in locating it in a main office at some business center or large city?

101. Does the control of a concern by the owners or by salaried managers produce the best result?

102. What is the committee system of management?

103. What is the purpose of the committees? Of whom should the membership consist? Who should act as chairman of the most important committees?

104. Why should the meetings of the job bosses and

the foremen be sharp and to the point? What class of men controls the labor situation in a factory?

105. What are the fundamental problems which in one form or another should be considered by the various committees?

CHAPTER XI

106. State the principle upon which an office system should be laid out.

107. Name the various departments that must be provided for under the heading of administrative offices. What two separate kinds of work does the accounting department embrace? What other series of departments closely connected with the factory organization should be considered in planning the administrative offices? How may the committee system be applied in office management?

108. Why is the question of internal communication of great importance in planning an office system?

109. What economies are there in having standard forms?

110. What are special reports? Regular reports? What general rules should be followed in the compilation of all reports?

111. What factors should decide the selection of a person who is to make a report?

112. In general what two things should always appear when possible in a report?

113. What data should the executive have in arriving at a standard of comparison in the process of production and in the commercial department? Why is the executive report considered the most important?

114. What is the chief purpose of the report from the selling department?

115. What items will form the basis of the factory report? Why is it desirable to take averages covering a period of six months or more in comparing weekly or monthly reports obtained from the factory?

116. Construct a form which will embody the data in the factory report. (The form given for the weekly progress report will offer some suggestions.)

117. Where are the cost reports treated of?

118. What two things determine the period covered by a report?

119. Why is it important that immediate and definite action should be taken on all reports?

PART II—BUSINESS MANAGEMENT

CHAPTER I

1. What are the cardinal elements of management?

2. How does the real efficiency engineer differ from the fake systematizer?

3. With what three forces does management deal?

4. Name the functions of the manager. Why is it unwise to tie him down to detail?

5. What is the field of the efficiency engineer? Of the mechanical? Why should a manager take an interest in the use his employees make of their leisure time?

6. State the basic principle in management.

7. What should be the ultimate aim of management?

8. From what kind of income should dividends be paid? State the methods by which immediate dividends are sometimes paid, to the detriment of future profits.

9. State the difference between the manager and the purely technical man.

10. What has been the effect of specialization on management?

11. Why is not specialization in the field of management more widely adopted?

12. Outline the general scheme of departmental specialization in the Pierce-Arrow Motor Car Works. What makes it necessary?

13. State the general trend of specialization.

14. To what extent may the various phases of business activity be classed as sciences?

15. Outline scientific methods of investigation as they apply to business management.

16. State a first practical rule in the application of scientific methods. Why must care be taken not to regard the laws deduced by investigation as final?

17. Why is the antipathy of some business men to "theory" unfounded? Distinguish between "common sense" and scientific investigation. How is this illustrated?

18. What is the effect of a new standard on the organization? What changes did the "shovel experiment" necessitate?

19. Is the teaching element a new one in business? How has it been developed? Describe the instruction of shovelers at the Bethlehem Steel Works.

CHAPTER II

20. Distinguish between principles and methods. What is the final test of a method of management?

21. Describe the division of economic units by function.

22. Name some important industrial units.

23. Distinguish between economics, industry, and business and show their relations.

24. Name the managerial or business units. State their functions. Show their relations. State the usual division of responsibilities among the executive officers of a corporation.

25. Who are members of the manager's cabinet? Why is this cabinet a necessity? What new member could profitably be added?

26. Of what does the staff organization consist? The line organization? State the relation of their members to the general manager.

27. Distinguish between the manager of the financial department and the financial specialist of a large concern. Describe the functions of the former.

28. Describe the duties of the sales manager.

29. What are the functions of the Accounting Department?

30. Over what does the jurisdiction of the manager of production extend?

31. What are the advantages of an organization chart? Name the four basic departments of an organization. State what their relations should be.

32. Show why these relations should exist by detailing the duties of the departments mentioned.

CHAPTER III

33. Enumerate the various types of management. Show how each has derived its name.

34. What are the chief characteristics and disadvantages of the unsystematized type?

35. To what condition has the prevalence of this type been due?

36. What are the chief characteristics and advantages of the systematized type?

37. What are the functions of the cost records? In what respect does the systematized type fall short according to the exponents of scientific management?

38. What are the distinguishing characteristics and advantages of the efficiency type of management, as compared with the unsystematized type? As compared with the systematized type?

39. State the theory underlying the standardization of costs.

40. Describe the course through the shop of a job ticket made up in the planning department and, by doing so, show how costs are determined as a by-product. What difference is there between system and efficiency?

41. State the advantages of comparative records. Compare the "deadly parallel" method with that based on predetermined standards.

42. Show the superiority of stock taking under scientific methods.

43. Differentiate as clearly as possible between the staff and military type of management and show how the terms originated.

44. Is the meaning that has been attached to "military" justified?

45. What are the functions of the general staff division of military organization? How is this division sub-divided?

46. What officers compose the military staff of a commander of a United States Field Army, and what are their duties?

47. State the functions of the administrative staff of an American Field Army.

48. Describe succession by seniority as it applies to the army.

49. How may the business man profit by understanding the organization of the army?

50. How is the theory of staff and line organization applied in the Sherwin-Williams Paint Company? What advantages are secured?

51. Do divisional and departmental types of management have to do only with the railroad? Why are examples taken from railroad management?

52. What significance does the word "department" have for the railroad man? For the industrial manager? State the chief characteristics and advantages of the departmental type of railroad management.

53. What is the opinion of Mr. Arthur Hale on these two systems of management? State the facts with which he supports his opinion.

54. Jot down side by side the advantages and disadvantages of the departmental and divisional types of management. Give examples of industries in which one or the other might be the better type to apply.

55. Can the advantages of both types be merged in one management?

CHAPTER IV

56. Make clear that these various comparisons of types of management are from several different viewpoints.

57. State the chief characteristics and disadvantages of the undisciplined type of management. Name some of the usual losses occasioned by it.

58. Why is labor efficiency low under management of this type?

59. State the chief characteristics and advantages of the disciplined type of management.

60. State some evidence of discipline. What is said of standard for output under this type. The selection of workers is touched upon. What points are made?

61. Show that the management of a concern may fall within two or more of these classes. Distinguish the traditional, transitory, and functional types and show their relations to types previously discussed.

62. Give two other names for functional management.

63. What is meant by planning? State the principle underlying it.

64. What, according to Mr. Henry P. Kendall, are the advantages of the planning department?

65. State the objections to a piece work system of wage payment. Name the five conditions upon which the efficiency of the worker depends under functional management.

66. What advantages may be gained by scientific selection of workers, and how does it aid discipline?

67. By whom are workmen trained under functional management? How does their being trained help discipline?

68. What is demanded of functional management regarding tools and machines?

69. How is discipline gained by providing a proper incentive for the workingman? What is meant by proper incentive?

70. What two broad and sweeping changes in management are recommended by Mr. Taylor in installing the functional type? What does he say functional man-

agement consists of? State in brief the duties of the "gang boss"; the "speed boss"; the inspector; the "repair boss"; the order-of-work or route clerk; the instruction card man; the time-and-cost clerk; the shop disciplinarian.

71. What is the keynote of all management? Name the four principles that should underlie all management.

72. What is said of the indispensable man?

73. How should we handle the exceptional man?

CHAPTER V

74. What factor in human nature militates against efficient management, and how does it do this?

75. What are the requirements of a good organization chart? What will it show?

76. State how it will help the employee? The manager? Discuss the organization chart shown on page 280.

77. State the advantages of the organization record and show how it supplements the organization chart.

78. What are some of the objections to a written record? What is the answer to these objections?

79. Why is the planning department a necessity?

80. What are its duties?

81. What saving resulted from the installation of a planning department at the Tabor Manufacturing Company? How were these savings effected?

82. Why do some managers object to the introduction of a planning department? What experiences are cited to show that this stand is not well taken?

83. Outline the evolution of the planning department.

84. What is said of the permanent records actually accumulated by the planning department?

85. Name the two main divisions of the planning department work. Mention the man taking charge of these and other sub-divisions of the work of the planning department.

86. What, in general, determines the proportion of planners to doers?

87. Write down the names of the men composing the planning department under consideration.

88. Detail the chief functions of the production clerk.

89. What information does he need? How does he get it? Name some of his important classifications of orders. Discuss their relative importance.

90. Describe fully the "checking-up" methods of the production clerk.

91. What qualifications are desirable in the production clerk? Define the scope of his authority.

92. What is the function of the route clerk? What must he know?

93. Detail the procedure of the route clerk in starting a piece of work through the shop.

94. Why should the route clerk be endowed with tact? How can he avoid "nagging"?

95. Under what condition is a special material or foundry clerk necessary? What are his duties?

96. Enumerate the duties of the balance-of-stores clerk.

97. What is the function of the time-study clerk?

98. State the duties of the instruction-card clerk.

99. Enumerate the details cared for by the route-file clerk.

100. Enumerate the details cared for by the order-of-work clerk.

101. Why may he be called the eye of the superintendent?
102. What details are cared for by the recording clerk?
103. What are the duties of the cost clerk and his assistants? What records come to him and what does he do with them?
104. What are the duties of the time-keeper?
105. Show that planning introduces no new duties.
106. Name the seven general functions of the planning department. What are the three things expected of the workers?

CHAPTER VI

107. Show the importance of correct standards in management.
108. State the commonest objection to the adoption of standards and show how it can be refuted.
109. What cautions must be kept in mind when adopting standards?
110. Show how standards have been applied to the Purchasing and Contracting Department. What advantages have resulted?
111. What has standardization accomplished in the New York City Government?
112. Look about your office and make a note of the opportunities for standardizing supplies.
113. Explain the multiple system of standard sizes.
114. What are the advantages of standardizing equipment?
115. How is standardization applied to delivery systems?
116. What advantages will be gained by having in-

terchangeable machine parts? Support your answer with examples.

117. Explain the use of "limiting dimensions."

118. State the requirements of a good symbol system.

119. Discuss the construction of a system of symbols.

120. Construct a simple working system of symbols for some line with which you are familiar.

121. When are numbers best as symbols?

122. Discuss the advantages of the several symbol systems described.

123. State the advantages of standardizing routine.

124. Describe the steps in developing standard routine.

125. What are the advantages of a printed record? What would be the best form for your business?

CHAPTER VII

126. Why do men have a standard weight, a standard yardstick, a standard time, etc.?

127. Why does a manufacturer wish to establish his production on the market as a standard of its kind? Why does he strive to establish standards for as many activities and processes as possible in the factory?

128. Provided that the inspection department is efficient, why is the determination of a standard time of prime importance?

129. What is betterment work?

130. What must be taken into consideration in determining wage systems?

131. What are the most prominent systems of pay in the United States? State the condition under which each has proved to be especially successful.

132. If you had a high-grade shop where the work

was standardized and the men well trained and the rate of production high, what system of payment would be likely to get the most out of the costly machinery and tools?

133. Under the efficiency system, how is the amount of bonus determined? What advantages has it over the Taylor system?

134. What is the importance of determining a standard time before deciding on a wage system?

CHAPTER VIII

135. What is said of the high cost of man power and its results?

136. What steps are being taken to-day to eliminate waste of human power?

137. State the theory underlying the "rest and relaxation" idea.

138. State the elements to be considered in determining a fair day's pay.

139. Go over the illustrations given, changing the figures so that they will apply to your business or to some business with which you are familiar.

140. State the special factors influencing wages.

141. Why should the chief incentive be increased wages?

142. Indicate the importance of short-period records as a pace.

143. Why are pleasurable surroundings important?

144. What is the importance of warmth?

145. How may self-interest be stimulated by the keeping of individual records?

146. Explain the advantage of the individual record in making promotions.

147. Explain how by their use the unfit can gradually be eliminated.

148. State the advantages gained by the use of individual records in the Metropolitan Street Railway Company.

149. Name some incentives that have worked well in special cases.

150. Show the importance of permanency of employment. Why have pension systems been established?

151. Show the importance of hope of advancement, as a stimulus.

152. State the policies of three important concerns in this regard.

153. Write down the qualities you would wish your employés to have.

154. What do you think you could accomplish as an employer by making a man analyze himself?

155. Describe the system of examination of the Chicago & Northwestern Railway.

156. What is the importance of physical and moral fitness?

157. State the attitude of the business world toward education. How is this evidenced?

158. Outline the instruction system of the National Cash Register Company. Of the National Commercial Gas Association.

CHAPTER IX

159. What were the first steps taken preliminary to industrial betterment? Compare the conditions in the factories in England during the first half of the Nineteenth Century with present conditions.

160. What was the origin of the term "welfare institutions"? Give arguments to show that welfare institutions are of real profit to the employer of labor. Name the duties of "welfare managers."

161. What general devices should be employed against accidents and fire?

162. What is the ideal location for a factory?

163. What devices are employed for good ventilation, plenty of light and sanitation?

164. Give some specific illustrations of good sanitation and cleanliness.

165. What is the importance of providing adequate quarters for the employé's lunch hour? Give some illustrations of this in the United States and France.

166. Name some of the considerations which come under the leading of recreation.

167. State the general effect of welfare institutions.

168. What are the objects of a suggestion system?

169. What results may be expected from the suggestion system? Support your answer by citing results that have been secured.

CHAPTER X

170. Of what use are statistics?

171. What is the chief advantage of the graph?

172. Show its use in comparing several sets of facts.

173. Illustrate its use in comparing periods of time.

174. Of what use are reports? Need they be delayed?

175. Outline the inspection methods of the Westinghouse Electric and Manufacturing Company.

176. Why should work in process be inspected?

177. What is the advantage of supplying the inspector with a list of questions?

178. State the qualifications of a good inspector.

179. How is information from the outside used to increase the efficiency of the inspection department?

180. Distinguish between the several kinds and methods of inspection.

181. What is research and how does it differ from inspection?

182. Describe the research laboratory of the J. I. Case Threshing Machine Company.

183. What are its objects?

184. Outline a time study for an operation in your business.

185. Reduce this study to a formula.

186. Name some of the valuable sources of printed information on business.

187. What are the advantages of a study of competitive methods and how may it be carried on?

188. How might consulting experts be used to advantage in your business?

CHAPTER XI

189. Give a notable example of the advantage of "routing."

190. Describe routing as it applies to the railroad.

191. Name the three essentials in routing.

192. Describe the two methods of securing a good plant lay-out.

193. Why is a straight line between terminals important?

194. Name the various types of manufacture.

195. What are the characteristics of the analytic type?
196. What are the characteristics of the continuous type?
197. What are the characteristics of the assembling type?
198. What must be taken into consideration in providing passageways and space for raw material?
199. Name all the considerations that will affect transportation within the plant.
200. To what extent should future growth be allowed for?
201. Describe several ways in which future growth has been provided for without sacrificing present efficiency.
202. What is meant by taking advantage of gravity?
203. How does the time element affect routing?
204. Name the two types of routing and describe them.
205. When is special dispatching necessary?
206. How does the planning department control the routing?
207. Describe the route-board and its use.
208. How is the worker notified of the jobs that have been planned ahead for him?
209. What questions are answered by the route-board?
210. What is meant by the status of work in progress? Outline methods of keeping track of it.
211. Outline the system of the New York Clearing House.
212. Describe its time schedule.
213. Why does organization save time?
214. What is the object of having substitute power equipment?

215. What is the equipment "tickler"?
216. Cite other methods of avoiding shut-downs.
217. Why is a stock-keeping system necessary?
What are the duties of a stock or tool department?
218. State the three rules of store-keeping.
219. Describe the procedure in receiving supplies.
From what three sources are supplies received?
220. What three distinctions should be made in issuing supplies?
221. Describe the requisition system of issuing materials.
222. Describe the "bill-of-materials" method.
223. How may these two systems be combined to advantage?
224. Outline the J. L. Mott Company's tool-room system.
225. Describe the single and double check systems.
226. Why is it necessary to have the stock-room under lock and key and accessible to but one person?
227. How are goods protected from depreciation in the stock-room?
228. Outline two methods of classification by kind in the store-room.
229. What should the stock ledger show?
230. Describe two methods by which the annual inventory-taking is avoided.
231. What is meant by providing a surplus of the less expensive?
232. What is said of small savings in manufacturing and other forms of business?
233. Enumerate some of the opportunities for saving in office work.
234. Show the importance of avoiding unnecessary shifting.

235. What is meant by "fill-in" work? Give some examples of savings that may be effected by it.

236. Pick out from the work going on about you some examples of waste motions and waste material.

237. Define and explain the importance of the by-product. Enumerate some businesses in which supplies can be used a second time.

CHAPTER XII

238. From what point of view must we consider the office for the purpose of this discussion?

239. What is the relation of the office to all other phases of the business? What should be the first step taken in securing efficiency in the office?

240. What qualifications are necessary therefore in the head of the office?

241. Why is the securing of maximum efficiency in the office a difficult proposition? What is said of the selection and handling of employés? How has welfare work been applied to the office?

242. Devise methods of establishing standards in your office.

243. Name the three types of office organization.

244. What are the characteristics of the functional type? Describe the functional organization of the office charted in Figure 24.

245. Why are combinations of the functional with other types sometimes advantageous?

246. Describe the committee system as it applies to the office. What are its advantages?

247. How does the suggestion system work out in the office?

248. What should be the guiding principles in the arrangement of an office? What effect has poor light on efficiency?

249. Summarize the principles underlying office organization and compare them with those underlying organization in the plant.

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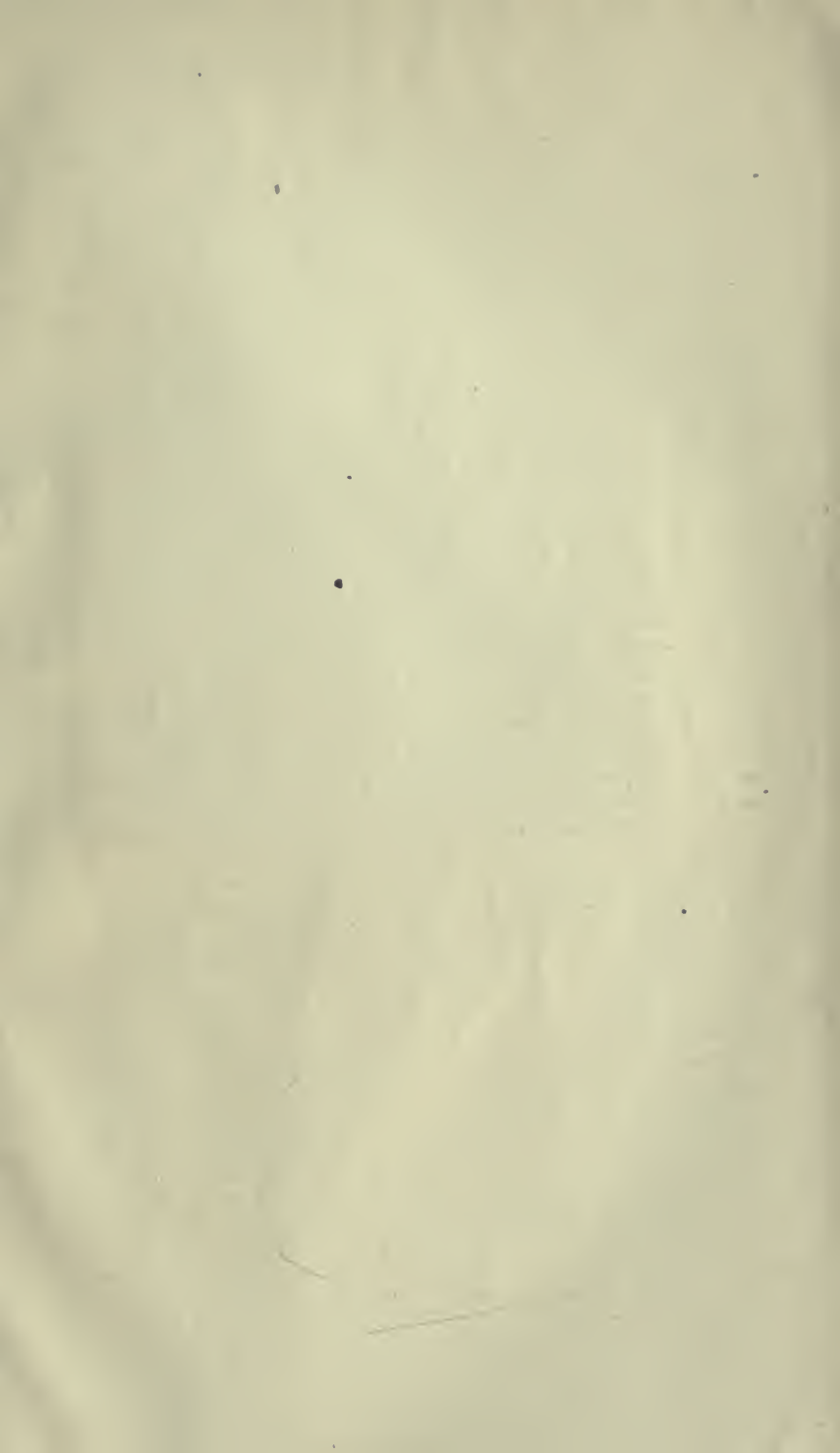
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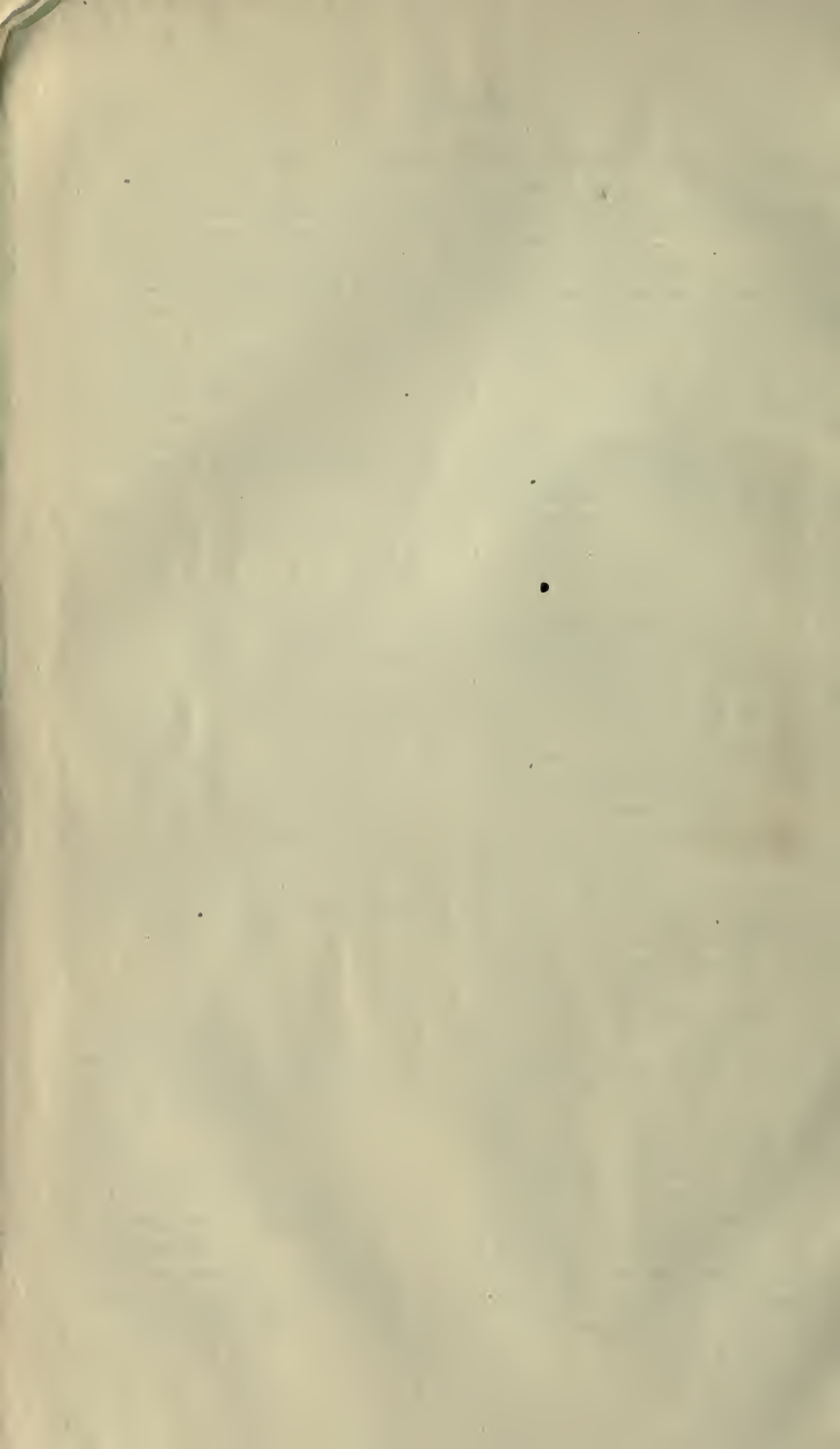
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